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EP 0 334 115 B1

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Description**1. Field of the Invention**

This invention relates to a method and apparatus for supplying rod-like articles, such as cigars, cigarettes, filter plugs, tampons or the like. More particularly, the invention relates to a system in which the rod-like articles are maintained in substantially the same orientation during transport in a rod-like article storing box having an open upper surface, as well as after they are discharged therefrom to a supply passage, without changing their orientation.

2. Description of Background and Pertinent Information

A conventional system for supplying rod-like articles is disclosed, for example, in Japanese Patent Laid-Open Application No 60-240628. That system includes a method and apparatus for supplying rod-like articles, wherein a rod-like article supplying passage is arranged at an inlet end of a storing device. A rod-like article storing box is arranged in an inverted condition upon the supplying passage by means of a guide of a box distributing mechanism. Thereafter, the storing box is pulled upwardly by the box lifting mechanism of the box distributing mechanism. The group of rod-like articles in the storing box is intended to be supplied onto the supplying passage without changing its stacked condition and, at the same time, the rod-like articles in one box are all transported by the pusher mechanism as they are piled in a direction perpendicular to a longitudinal direction of the rod-like articles, and transported into the storing device. The lifted empty storing box is discharged from the supplying passage by an empty box discharging mechanism.

British Patent Specification No 2 188 912A also discloses a system for discharging rod-like articles from an inverted box into a supplying passage wherein the rod-like articles are discharged from the box onto a platform which is lowered onto the supplying passage whilst front and rear partition plates which extend upwardly from the passage to the box retain the discharging rod-like articles.

3. Problems Solved by the Invention

Problems are presented, however, in the conventional type of rod-like article supplying method and apparatus. Specifically, in the case of the Japanese publication system a difference in size exists between the inner dimension of the storing box and the inner dimension of the guide for holding the box, so as to move the box up and down, when

there is a handle or a projection such as reinforcing member or the like on the outer surface of the storing box, due to the fact that the storing box held in its inverted condition with the box distributing mechanism is raised by the box lifting mechanism in an attempt to remove the rod-like articles from the box without changing its piled-up condition. Further, when the storing box is lifted, and this also applies in the case of the system of the British patent specification the rod-like articles tend to roll out of the box, causing a disturbance in the attitude of the rod-like articles and, at the same time, the stable transportation of the articles cannot be effectively performed with a pusher mechanism and, in fact, the storing box is limited to one having a thin wall thickness and having no projection on its outer surface.

Since the storing box after emptying could not be returned to the box distributing mechanism without disturbing the removed rod-like articles, in the prior Japanese apparatus it was necessary to provide an empty box discharging mechanism for discharging the empty box from the supplying passage. Consequently, the device became complicated and the entire device became large in size.

SUMMARY OF THE INVENTION

An object of the present invention, therefore, is to overcome the aforementioned problems presented by the prior apparatus.

According to the present invention there is provided a method of conveying articles comprising:

(a) receiving a group of rod-like articles (B) in a predetermined configuration in a storage container (A) at a receiving location;

(b) moving said group of articles (B) in said predetermined configuration in said storage container (A) from said receiving location to a discharging location proximate a supply passage by inverting the container;

(c) discharging said group of articles (B) from said storage container (A) at said discharging location by raising the container so that the articles fall in a block therefrom; and

(d) conveying said group of articles (B) in a direction along said supply passage while substantially maintaining said group of articles (B) in said predetermined configuration, characterised by

(e) containing said group of articles (B) substantially in said predetermined configuration as said group of articles (B) is discharged from said storage container by raising front and rear partition members such as plates, which are spaced by the width of the block, simultaneously with the raising of the container.

Also according to the invention there is provided an apparatus for conveying a group of rod-like articles (B) comprising:

- (a) a supply passage along which said group of articles (B) is conveyed in a first direction;
- (b) means for (i) receiving a group of said articles in a predetermined configuration in a storage container (A), (ii) moving said group of articles (B) in said predetermined configuration in said storage container (A) from a receiving position to a discharging position by inverting the container, said discharging position being proximate said supply passage, and (iii) raising the container to cause the group of articles to fall in therefrom at said discharging station in a block defining said predetermined configuration;
- (c) front and rear partition members such as plates for containing said group of articles (B) substantially in said predetermined configuration; characterised by
- (d) means adapted to raise said front and rear partition members simultaneously with the raising of the storage container (A) for containing said group of articles (B) substantially in said predetermined configuration as said group of articles (B) is discharged from said container (A).

In a further aspect of the invention, a transporting mechanism is provided for moving containers into the feeding position. The transporting mechanism can include a pusher for pushing the containers into the feeding position. The transporting mechanism can further include an engaging claw mounted for movement on the pusher for engagement with and disengagement from a hook element of the container.

In a further aspect of the invention, an inverting device is provided and includes an upwardly facing open side in the feeding position, and a selectively actuatable lid extending over at least a portion of the open side.

According to a further aspect of the invention, the transporting device is configured to move the inverting device sequentially from the feeding position upwardly to an upper extreme position and downwardly therefrom, such that the open side is downwardly facing, to the discharging position.

A driven member is further provided for connecting the forward and rearward partition plates which is adapted to support the articles discharged at the discharging position. The driven member further includes, in one embodiment, a receiving surface for supporting the articles and movable between a supporting position slightly above an upper surface of the supply passage and a retracted position in which the forward and rearward partition plates are below the upper surface of the supply passage. A first drive apparatus is further

provided to move the driven member in a substantially vertical direction between the supporting position and the retracted position. Further, a second drive apparatus operatively associated with the driven member is provided to move the driven member substantially in the predetermined direction of the supply passage from a receiving position to an advanced position proximate the forward partition plate of the partition mechanism.

According to a still further aspect of the invention, the containing mechanism further includes at least one selectively movable side plate positioned along side the supply passage.

According to a still further aspect of the invention, a shutter mechanism is located along the supply passage downstream of the forward end of the predetermined configuration in the predetermined direction of the supply passage, in the discharging position, for blocking advancement of the articles along the supply passage. The shutter mechanism includes a shutter plate mounted on either side of the supply passage for reciprocation between a closed position in which the shutter plates are spaced apart a distance less than the length of one the rod-like articles and an open position in which the shutter plates are spaced apart a distance greater than the length of one of the rod-like articles.

According to a still further aspect of the invention, the supply passage includes a supply conveyor, and further includes a drive apparatus for driving the supply conveyor, a drive apparatus for driving the lateral feeding mechanism, and an apparatus for driving the supply conveyor and the lateral feeding mechanism at substantially the same speed. The drive apparatus for the lateral feeding mechanism and the drive apparatus for the supply conveyor can share a common drive motor. Further, the drive apparatus for the supply conveyor can include a clutch to stop movement of the supply conveyor during predetermined times. Further, the lateral feeding mechanism includes a reciprocal member for advancing the articles in the direction of movement of the supply conveyor and wherein the predetermined times at which the clutch stops movement of the supply conveyor occur during retraction of the reciprocal member in a direction substantially opposite to the direction of movement of the supply conveyor.

According to a still further aspect of the invention, the articles are rod-like articles having a predetermined length and the lateral feeding mechanism includes a lateral feeding plate for engaging the rearward end of the configuration of the rod-like articles, having a width transverse to the predetermined direction of the supply passage less than the length of one of the rod-like articles.

According to a still further aspect of the invention, the supply passage includes a plurality of side-by-side conveying elements, at least two of which are spaced apart a predetermined amount, wherein the forward partition member, the rearward partition member, and the upper support surface of the driven member are extended between two of the plurality of side-by-side conveying elements to contain the rod-like articles in substantially the predetermined configuration.

According to a still further aspect of the invention, the partition mechanism is operable to move the rod-like articles in substantially the predetermined configuration in substantially the predetermined direction of the supply passage. The shutter mechanism is located along the supply passage downstream of the forward end of the predetermined configuration in the predetermined direction of the supply passage, in the discharge position, and the partition mechanism is operable to move the rod-like articles to a position substantially adjacent the shutter mechanism, whereby the shutter mechanism blocks movement of the rod-like articles in the predetermined direction of the supply passage. Further, the conveying elements are driven for movement, and the shutter mechanism is movable between a blocking position and an open position, and in the open position the feeding mechanism and the conveying elements move substantially at the same speed in the predetermined direction to advance the rod-like articles from the discharge position.

According to a still further aspect of the invention, a storage device communicates with the supply passage downstream of the discharging position of the rod-like articles such that the rod-like articles are advanced toward the storage device.

According to a still further aspect of the invention, the rearward partition member includes a pair of rearward partition plates spaced apart a distance greater than the width of the lateral feeding plate to permit the lateral feeding plate to extend between the pair of rearward partition plates to engage the rearward end of the predetermined configuration of articles.

According to another embodiment of the invention, a relatively stationary receiving surface is provided for receiving the articles in the predetermined configuration at the discharging position, and a transfer mechanism for transferring the articles in the predetermined configuration to the supply passage is provided. The supply passage has an upper support surface and the receiving surface is substantially flush with the upper support surface, and the transfer mechanism includes a pushing mechanism for pushing the articles in the predetermined configuration across the receiving surface onto the upper support surface of the supply

passage. Further, the pushing mechanism includes a pusher plate mounted for movement across the receiving surface as the articles are pushed across the receiving surface to a position alongside the supply passage to thereby function as a guide as the articles in the predetermined configuration are moved along the supply passage in the predetermined direction, and a side wall plate is positioned along an opposite side of the supply passage from the pusher plate. The side wall plate is mounted for movement in conjunction with and at substantially the same speed as the pusher plate of the transfer mechanism to maintain a spacing therebetween slightly wider than the length of one of the articles to maintain the articles in the predetermined configuration during transfer.

In the receiving position, the container has an upwardly facing opening, and the means for (i) receiving, (ii) moving, and (iii) discharging further includes the means for (iv) inverting the storage container to thereby direct the upwardly facing opening downwardly and for (v) releasing the group of articles from the storage container and withdrawing the storage container from the discharging position in a predetermined direction.

The invention further includes means for moving the forward member and the rearward member of the containing means in the predetermined direction in which the storage container is withdrawn as the storage container is withdrawn. The container is preferably withdrawn upwardly.

In the invention, the supply passage has a support surface, the forward member and the rearward member of the containing means are mounted for movement from below the support surface to above the support surface, and the containing means further includes means for moving the articles in the first direction.

Further, the supply passage includes, in one form, a plurality of side-by-side spaced apart support surfaces and wherein the forward member and the rearward member of the containing means are arranged for movement between a pair of the support surfaces. A receiving surface is also provided for receiving the group of articles at the discharging position, and the forward member and the rearward member of the containing means are movable upwardly to contain the group of articles in the predetermined configuration on the receiving surface. Further, means for transferring the group of articles in the predetermined configuration from the receiving surface to the supply passage is provided. The means for conveying includes a pusher for exerting a force against the articles. Further, the means for conveying includes a powered conveyor supporting the articles from below. Still further, a support surface is provided, across which the pusher conveys the articles.

Still further, means for blocking movement of the articles along the supply passage is provided, mounted for movement between a blocking position and an open position at which position the articles are permitted to move along the supply passage.

The predetermined configuration of the group of articles includes a predetermined width in the direction of the supply passage, the articles are loose within the container, and the step of containing includes maintaining the predetermined width substantially constant.

The step of conveying further includes conveying the group of rod-like articles in a direction substantially perpendicular to the lengths of the rod-like articles being conveyed.

The step of moving includes inverting the storage container between the receiving location and the discharging location.

Still further, the step of discharging includes raising the inverted storage container from the discharging location to thereby empty the storage container.

Still further, the step of containing the group of articles in the predetermined configuration further includes raising a pair of partition members which are spaced apart by a distance substantially equal to a distance between a pair of inner walls of the storage container.

Still further, the method includes the steps of advancing the group of articles along the supply passage by means of the partition members to a predetermined location, blocking further advancing of the group of articles by means of a shutter mechanism, and retracting the partition members from the supply passage.

Still further, the method includes the step of opening the shutter mechanism to permit further advancing of the group of articles beyond the shutter mechanism.

Still further, the method includes the step of transferring the group of articles in the predetermined configuration substantially transversely onto the supply passage.

Still further, the method includes the step of returning the storage container, after discharging the group of articles therefrom, to the receiving location.

BRIEF DESCRIPTION OF DRAWINGS

Figs. 1-5 illustrate a first embodiment of the invention:

Fig. 1 is a front elevation view, partially broken away, illustrating a rod-like article supplying device of a preferred first embodiment of the invention;

5

Fig. 2 is a side elevation view, partially broken away;

Fig. 3 is a front elevation view illustrating a condition in which the partition plates are moved upwardly, with only substantial portions being shown;

Fig. 4 is a plan view of Fig. 3 in partial section; and

Fig. 5 is a plan view in section, illustrating a condition in which the partition plates are advanced.

10

Figs. 6-10 illustrate a second embodiment of the invention:

Fig. 6 is a side elevation view, partially broken away, of the rod-like article supplying device, illustrating a preferred second embodiment of the invention;

Fig. 7 is an enlarged longitudinal side elevation in section illustrating a substantial part of the invention of the condition in which the partition plates are moved upwardly;

Fig. 8 is a plan view in section;

Fig. 9 is an enlarged longitudinal side elevation view, illustrating a substantial part of the invention of the condition in which the rod-like article group is transported onto the supplying passage with the pusher; and

Fig. 10 is a plan view in section.

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DESCRIPTION OF PREFERRED EMBODIMENTS

In view of the problems in prior apparatus as described above, it is an object of the present invention to remove the rod-like article from the storing box from its inverted position at a discharging location without changing the predetermined configuration of the articles as contained within the storing box; to enable the storing box to be used without any regard as to the presence or absence of any projection elements at the outer surface; and, at the same time, to enable the empty storing box to be returned.

The method of the first embodiment of invention is characterized in that a rod-like article storing box with its top surface being open is inverted by being transported to the inverted position and transported, in this inverted position, in a substantially vertical direction, being supplied to a rod-like article supplying passage communicating with a storing device through a shutter plate which can be opened or closed. A pair of front and rear partition plates are lifted in cooperation with the returning and lifting of the storing box to support a group of rod-like articles discharged from the box without substantially varying the piled-up condition, i.e., the predetermined configuration. Thereafter, the front and rear partition plates are moved laterally in a forward supplying direction by a desired and pre-

9

EP 0 334 115 B1

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determined distance to cause the front end surfaces of the group of rod-like articles to be adjacent a shutter plate mechanism. A lateral transmitting pusher is advanced by a desired and predetermined distance against the rear end surface of the group of the rod-like articles. Thereafter, the front and rear partition plates are lowered and, at the same time, the shutter plate is opened to cause the rod-like articles on the supplying passage to be moved in such a direction substantially perpendicular to the longitudinal direction of the rod-like articles and transported into the storing device.

The apparatus of the first embodiment of the invention is characterised in that a rod-like article supplying passage communicating with an inlet end of a storing device extends laterally, a box distributing mechanism for reversing and transferring a rod-like article storing box, with its upper surface being opened is slidably moved in an upside down U-shaped structure in a direction substantially perpendicular to the feeding direction from a feeding position to a discharge position, and a partition mechanism having a front and rear partition plate is positioned at the discharge position to be substantially flush with each of the front and rear inner surfaces of the box. The apparatus further includes a shutter mechanism which can be opened or closed in a direction substantially perpendicular to the supplying direction, located at a front end of the supplying direction on the supplying passage, and a lateral feeding pusher mechanism which can be reciprocated toward the shutter mechanism from the rear end of the supplying direction.

The method of the second embodiment of the invention is characterised in that a rod-like article storing box having its upper surface open is inverted by being transported to the inverted position and transported, in this inverted position, in a substantially vertical direction, being supplied to a transporting and receiving surface, which is substantially flush with a rod-like article supplying passage which communicates with a storing device and is substantially parallel with the same through a shutter plate which can be opened or closed. A pair of front and rear partition plates are lifted in cooperation with the returning and lifting movement of the storing box to cause a group of rod-like articles within the box to be supported without substantially varying their piled-up condition. Thereafter, the group of rod-like articles discharged from the box is moved substantially horizontally in a longitudinal direction of the rod-like articles by a desired and predetermined distance by means of the pusher, and supplied in such a way that the front end surface of the group of rod-like articles is close to the shutter plate and the rear end surface is close to a lateral feeding pusher, respectively,

and, at the same time, the rod-like articles on the supplying passage are transported together by the lateral feeding pusher mechanism and are transported into the storing device.

The apparatus of the second embodiment of the invention is characterized in that a transporting and receiving surface substantially parallel with a rod-like article supplying passage laterally installed at an inlet end of a storing device is arranged laterally substantially flush with the supplying passage. A box distributing mechanism for reversing and transporting a rod-like article storing box with its upper end being open is reciprocably arranged in an upside-down U-shaped structure from the transporting and receiving surface to receiving position. A partition mechanism having a front and a rear partition plate installed substantially vertically is reciprocably arranged in a substantially vertical direction below the transporting and receiving surface where the storing box is supplied in its inverted condition in such a way that it is substantially flush with the front and rear inner surfaces of the box and, at the same time, a pusher slightly smaller than an inner width between the front and rear partition plates is reciprocably arranged from the transporting and receiving surface onto the supplying passage in a direction substantially perpendicular to the supplying direction. A shutter mechanism which can be opened or closed is arranged at a front end of the supplying direction on the supplying passage and a lateral feeding pusher mechanism which can be reciprocated is arranged from a rear end of the supplying direction toward the shutter mechanism.

The first embodiment of the invention is operated such that the storing box containing the rod-like articles therein is transported by the box distributing mechanism from a receiving position to the rod-like article supplying passage in a discharge position in an inverted state and held in the inverted state. Thereafter, the storing box is lifted and returned to the receiving position, and, at substantially the same time, front and rear partition plates are lifted with the lifting of the storing box. Thereby, the group of rod-like articles within the box is supported without substantially changing its predetermined configuration. Thereafter, the front and rear partition plates are laterally moved in a forward supplying direction to cause the front end surface of the group of rod-like articles to approach the shutter plate. Further, the lateral feeding pusher is advanced to approach the rear end surface of the group of rod-like articles. Thereby, the group of rod-like articles can be supported in its predetermined configuration and, thereafter, the front and rear partition plates are lowered and the group of rod-like articles is transported by the lateral pusher.

The second embodiment of the invention is operated such that the rod-like article storing box is transported by the box distributing mechanism from the receiving position and held on the transporting and receiving surface in an inverted state. Thereafter, the storing box is lifted and returned to the receiving position, and, at substantially the same time, the front and rear partition plates are lifted with the lifting of the storing box. Thereby, the group of rod-like articles within the box is supported on the transporting and receiving surface without substantially changing its predetermined configuration. The front end of the group of rod-like articles approaches the shutter plate under a pushing operation in a direction substantially perpendicular to the supplying direction of the pusher and, in turn, its rear end surface approaches the lateral feeding pusher, respectively, to move onto the supplying passage. The group of rod-like articles is then supported between the lateral pushers from the shutter plate in the predetermined configuration, and then they are transported by the lateral pushers.

The preferred embodiments of the invention will now be described with particular regard to the drawings.

As shown in Figs. 1 to 5, the first preferred embodiment of the present invention is constructed such that a rod-like article supplying passage 1 is constituted by a pair of right and left substantially horizontal and substantially parallel endless belt conveyors communicating downstream with a belt conveyor C₁ which constitutes a movable floor of a storing device C. Further, a box distributing mechanism 2 and supporting framework is arranged substantially perpendicularly to the supplying passage 1.

The box distributing mechanism 2 includes a reversing frame 2a, containing a rod-like article storing box A, and a pair of conveyor chains 2b, 2b connected to both side surfaces of the reversing frame 2a for reciprocating the frame by a desired amount in a substantially vertical direction and a direction substantially perpendicular to the supplying direction. The conveyor chains 2b, 2b are driven by a drive motor and associated apparatus shown in Fig. 1 at the bottom of the supporting framework to cause the reversing frame 2a to be lifted from a feeding, or receiving, position to an upper limit position where it is caused to be inverted and then descended while being in the inverted or reversed condition. It is stopped at a position slightly above the supplying passage 1 and then held.

The rod-like article storing box A is formed from metal, such as aluminum, or from synthetic resin. Openings A₁ and A₂ in box A are formed at the upper surface and longitudinal side surface,

respectively. Inverted L-shaped hooks A₃ project from the upper end of one of the short sides. A quantity of rod-like article B, such as cigars, cigarettes, filter plugs, or tampons, are arranged to be piled up in such a way such that they are longitudinally directed, or face the longer sides of the storing box A, in a predetermined configuration.

The reversing frame 2a is box-shaped and has an internal size slightly larger than the external size of the storing box A. An opening 2a₁ is formed at one side surface of short length and the storing box A is fed in or fed out through this opening 2a₁. A pushing plate 2a₂ abuts against the opening side surface A₂ of the storing box A and is arranged at one longitudinal side inner surface. Its upper surface is open and a pair of opening or closing lids 2a₃, 2a₃ are longitudinally arranged in a side-by-side relationship. Each lid can be pivotally mounted around a respective pivot pin from a closed position to an open position shown in solid lines and phantom lines, respectively, in Fig. 2.

Both opening or closing lids 2a₃, 2a₃ are biased in a closing direction by a resilient member, such as a spring or the like, which can take the form of a coil spring wound around each pivot pin, for example.

When the reversing frame 2a is moved by the conveyor chains 2b, 2b, the upper surface opening A₁ of the storing box A is closed to prevent the rod-like articles B from being moved therefrom. However, when the reversing frame 2a is placed at the feeding position and when the reversing frame is inverted at its upper limit position and then held at the inverted position during which the upper portion of the partition mechanism 3 is positioned below the supplying passage 1, it is mechanically opened or is opened by means of an air cylinder and the like. For example, such air cylinders can be mounted directly on the reversing frame 2a for opening respective lids. Alternatively, abutment members fixed to the framework support chains 2b, 2b for movement therewith can be mounted for engagement with respective cooperating members for lids 2a₃, 2a₃ to open the lids as the reversing frame reaches the discharging, inverted, position.

Each of the right and left sides of the supplying passage 1 is provided with a side wall 1a, comprised of a transparent plate. The right and left side walls 1a, 1a are movably supported in a direction substantially perpendicular to the supplying direction with an air cylinder or the like. When the reversing frame 2a is placed on the supplying passage 1 under operation of the box distributing mechanism 2, side walls 1a, 1a are opened so as not to hinder the opening or closing operation of the opening or closing lids 2a₃, 2a₃. However, substantially simultaneous with the returning movement of the storing box A, they are closed so that

the spacing therebetween is slightly greater than the length of the rod-like articles B.

A partition mechanism 3 is comprised of a driven member 3a laterally arranged in a supplying direction between the two belt conveyors constituting the supplying passage 1, a front partition plate 3b substantially vertically positioned in front of the driven member 3a, a pair of right and left rear partition plates 3c, 3c substantially vertically arranged at the rear part of the driven member 3a, an air cylinder 3d for use in performing a substantially vertical movement cooperatively arranged below the driven member 3a, and an air cylinder 3e for use in performing a selective forward or rearward movement. The forward to rearward inner width between the forward and rearward partition plates 3b and 3c, 3c is substantially the same as the longitudinal inner width of storing box A and the height of the forward or rearward partition plates 3b and 3c, 3c are substantially the same as the inner height from the upper surface of the driven member 3a to the opposite side of storing box A.

The driven member 3a forms a substantially horizontal receiving surface 3a₁ on its upper surface. At the upper limit position of the driven member 3a where the rod of the air cylinder 3d for use in performing the substantially vertical movement, the receiving surface 3a₁ is projected slightly above the upper surface of the supplying passage 1. At the lower limit position where the rod is moved downwardly, the upper ends of the forward or rearward partition plates 3b and 3c, 3c are lower than the upper surface of the supplying passage 1. At the rearward limit position of the driven member 3a where the rod of the air cylinder 3e for use in performing a forward or rearward movement is moved rearwardly in the supplying direction, the forward and rearward inner surfaces of the forward or rearward partition plates 3b and 3c, 3c are arranged on the supplying passage 1 to be substantially flush, respectively, with the forward and rearward inner surfaces of the storing box in its inverted condition in a substantially vertical direction. At the forward limit position of the driven member 3a where the rod is moved forwardly in the supplying direction, the front surface of the forward partition plate 3b advances as much as possible toward the forward end of the supplying passage 1 in the supplying direction, i.e., adjacent the right and left shutter plates 4a, 4a of the shutter mechanism 4 arranged at the storing device C, or it is fitted into the space between the shutter plates 4a, 4a.

The right and left shutter plates 4a, 4a are about the same size as or greater than the inner height of the storing box A and extend in a substantially vertical direction. The shutter mechanism further includes air cylinders 4b, 4b for reciprocating

the right and left shutter plates 4a, 4a in a direction substantially perpendicular to the supplying direction. The spacing between the right and left shutter plates 4a, 4a is greater than the lateral width of the forward partition plate 3b and less than the length of the rod-like article B when closed, and is slightly greater than the length of the rod-like article B when opened.

The right and left shutter plates 4a, 4a are spaced from the reversing frame 2a when the reversing frame is reversed and moved on the supplying passage 1 to thereby not hinder its movement. At the rear end of the supplying direction of the supplying passage 1 the lateral feeding pusher mechanism 5 is arranged and also spaced from the reversing and transporting operation of the reversing frame 2a.

The lateral pusher mechanism 5 is comprised of a lateral feeding plate 5a having a lateral width slightly less than the lateral width between the right and left partition plates 3c, 3c of the partition mechanism 3 and has a height about the same as or slightly greater than the inner height of the storing box A, extending from slightly above the receiving surface 3a₁ at the upper limit position. The lateral pusher mechanism 5 also includes a reciprocating device for use in reciprocating the lateral feeding plate 5a in the supplying direction. In the preferred embodiment of the present invention, this reciprocating means includes a cooperating arm 5b at the rear surface of the lateral feeding plate 5a and a slider 5c cooperatively arranged at the extreme end of the cooperating arm 5b. The slider 5c and arm 5b are reciprocated along the supplying passage 1 by the chain 5d by a predetermined amount.

Through the above-mentioned arrangement of the reciprocating means 5b, 5c, and 5d, the lateral feeding plate 5a is located in a position not hindering the reversing and transporting operation of the reversing frame 2a. At its retracted position, the front surface of the plate is passed between the right and left shutter plates 4a, 4a and at its forward limit position, its front surface slightly enters into the storing device C.

In the preferred embodiment of the present invention, a motor 5e for driving chain 5d of the lateral feeding pusher mechanism 5 is also operatively connected to a driving mechanism for the belt conveyor for the supplying passage 1. Thereby, these two elements are operated at substantially the same speed. A clutch 5f is placed between the belt conveyor of the supplying passage 1 and the motor 5e, the clutch 5f being operated when the lateral feeding plate 5a is retracted in a rearward supplying direction so as to cut off the transmission from the motor 5e so that the belt conveyor of the supplying passage 1 is prevented

from being operated.

At the side of the feeding or receiving position of the box distributing mechanism 2 a transporting carriage D is located having a plurality of storing boxes A arranged in parallel form. The storing boxes A are fed in or fed out, one-by-one, between the carriage D and the feeding position by the transporting mechanism E from above the carriage D to above the feeding position.

The transporting mechanism E includes a pusher E₁ having its extreme end projected to the side of the storing box A and a slider E₂ cooperatively arranged at the base end of the pusher E₁, as well as a chain E₃ connected to the slider E₂ for reciprocating the slider in a substantially horizontal direction in a desired and predetermined amount. An engaging claw E₄ at the extreme end of the pusher E₁ is removably engaged with the hook element A₃ at the outer surface of the storing box A. As shown, engaging claw E₄ is preferably formed at the end of an arm which is mounted for selective pivotal movement to move claw E₄ to be engaged and disengaged with hook element A₃. The pusher E₁ is advanced while engaging claw E₄ is engaged with the hook element A₃ to thereby move the storing box A to the feeding or receiving position. The pusher E₁ is then retracted while being engaged with hook element A₃ so that the storing box A is pulled from its feeding position, thereby moving the storing box A onto the carriage D.

The sequential operation of the first embodiment will now be described.

The storing box A containing a quantity of rod-like articles B in a predetermined configuration in a piled-up form is pushed from the carriage D under advancement of the pusher E₁ of the transporting mechanism E into the reversing frame 2a waiting at the feeding position of the box distributing mechanism 2, i.e., at its lower position. Thereafter, the pusher E₁ releases the engaged condition between the engaging claw E₄ and the hook element A₃ of the storing box A by moving the arm carrying claw E₄ downwardly. Pusher E₁ is then retracted to the position where it does not hinder the lifting or descending of the reversing frame 2a.

When the storing box A is transported into the reversing frame 2a, the reversing frame 2a is lifted from the feeding position, shown in solid lines in Fig. 1, under the driving operation of the conveyor chains 2b, 2b. In the preferred embodiment, the opening and closing lids 2a₃, 2a₃ are biased closed by means of resilient elements during this lifting movement. The reversing frame 2a then reaches the upper limit position, and then descends, thereby inverting the storing box A. It is then stopped slightly above the two conveyor belts of supplying passage 1, as shown in phantom lines in Figs. 1

and 2. After it is confirmed that the movement of the reversing frame 2a is completely stopped, the opening and closing lids 2a₃, 2a₃ are opened by means of a selective actuating device, acting against the resilient biasing elements.

As the opening or closing lids 2a₃, 2a₃ are opened, the rod-like articles B in the storing box A are transported through the opening A₁, now located beneath the rod-like articles, onto the upper surface of the two belt conveyors constituting the supplying passage 1. Thereafter, the empty storing box A is lifted, together with the reversing frame 2a of the box distributing mechanism 2, under operation of the conveyor chains 2b, 2b, back to the feeding, or receiving, position. However, as the empty storing box A starts to rise under the operation of the box distributing mechanism 2, the forward and rearward partition plates 3b and 3c, 3c simultaneously begin to rise under operation of the air cylinder 3d in a substantially vertical direction to contain the group of rod-like articles B in its aforementioned predetermined configuration. At this time, side walls 1a, 1a move toward each other to retain the rod-like articles longitudinally.

During this time, the group B₁ of rod-like articles on the supplying passage 1 tend to move from the predetermined configuration at its forward and rearward ends as the storing box A is lifted. However, it is guided again by the forward and rearward partition plates 3b and 3c, 3c, so that its predetermined configuration is substantially the same as when it is stored in the storing box A. As the driven member 3a, shown in Figs. 2 and 3, reaches its upper limit position, the group of rod-like articles B₁ from the discharge box are engaged and supported by the receiving surface 3a₁ of the driven member 3a.

Then, as the driven member 3a completes its upward movement, it is advanced forwardly by the air cylinder 3e, cylinder 3e being used in performing a forward or a rearward movement. The forward surface of the front partition plate 3b thereby reaches an advanced position adjacent the right and left shutters 4a, 4a which are kept closed as much as possible. Preferably, partition plate 3b advances to a position between both plates 4a, 4a and stopped, as shown in Fig. 5. After it is confirmed that the forward movement of the driven member 3a and the front end surface of the group of rod-like articles B₁ has reached the rear surfaces of the right and left shutter plates 4a, 4a, the lateral feeding plate 5a of the lateral feeding pusher mechanism 5 is advanced between the right and left rearward partition plates 3c, 3c and then is stopped when the front end surface abuts against the rear end surface of the group of rod-like articles B₁. The partition mechanism 3, shutter mechanism 4, and feeding mechanism, together with side

plates 1a, 5 thus effectively act as a containing mechanism for containing the articles on conveyor 1 substantially in the same configuration as that in which the articles are maintained in storing container A.

After the advancement of the lateral feeding plate 5a is stopped, the driven member 3a and the forward or rearward partition plates 3b and 3c, 3c are moved in a downward direction, thereby the group of rod-like articles B₁ on the receiving surface 3a₁ is placed again onto the two belt conveyors constituting the supplying passage 1. The front end surfaces of the group are supported by the right and left shutter plates 4a, 4a, its rear end surfaces are supported by the lateral feeding plate 5a, respectively, and its predetermined configuration remains substantially unchanged.

When the driven member 3a and the forward or rearward partition plates 3b and 3c, 3c reach their lower limit positions, they are retracted back to their original positions and, at substantially the same time, the right and left shutter plates 4a, 4a are opened so as to connect the rear end surfaces of the group of the rod-like articles B₂ already transported in the supplying direction through the shutter plates 4a, 4a, into the storing device C with the group of rod-like articles B₁ positioned rearward of the shutter plates 4a, 4a. Therefore, it can readily be appreciated that the thicknesses of the right and left shutter plates 4a, 4a and the forward partition plate 3b positioned between these groups B₁ and B₂ of the rod-like articles should preferably be as small as possible to thereby most efficiently transfer sequentially transferred groups toward the storing device C while maintaining the groups in their predetermined configurations.

Thereafter, the lateral feeding plate 5a of the lateral feeding pusher mechanism 5 and the two belt conveyors constituting the supplying passage 1 in the preferred embodiment are advanced at substantially the same speed to cause the groups B₁ and B₂ of the rod-like articles to be moved laterally, pass between the right and left shutter plates 4a, 4a, and then transported and fed into the storing device together at the inlet end of the storing device C.

At the movement the lateral feeding plate 5a passes between the right and left shutter plates 4a, 4a and slightly enters the storing device C, the right and left shutter plates 4a, 4a are closed. Thereafter, only the lateral feeding plate 5a is retracted, passing between the closed right and left shutter plates 4a, 4a, and then is returned to its original position.

When the lateral feeding plate 5a is returned, as described above, the two belt conveyors constituting the supplying passage 1 remain stopped and the transported groups B₁ and B₂ of the rod-

like articles are not moved.

The empty storing box A returned to the feeding position of the box distributing mechanism 2 is pulled onto the carriage D by means of engaging claw E₄ engaging with hook element A₃ of the storing box A. The storing box A is then discharged by being moved out of alignment with pusher E₁ of the transporting mechanism E by movement of carriage D, or by means of a device located on carriage D for exchanging a filled storage box A for the empty one. Thus, the subsequent storing box A, in which a further group of rod-like articles B is stored, is transported to the feeding position with the transporting mechanism E, and the operation as described above will be repeated for this subsequent storing box.

The second embodiment of the invention, as illustrated in Figs. 6 through 10, is constructed such that the shutter mechanism 4 and the lateral feeding pusher mechanism 5 are arranged on the supplying passage 1 which is preferably constituted by one endless belt conveyor, and a transporting and receiving surface 6 is arranged substantially parallel with the supplying passage 1 or substantially flush with or slightly higher than the upper surface of the belt conveyor. Further, the storing box A is inverted over the transporting and receiving surface 6 by means of the box distributing mechanism 2. A partition mechanism 3 is installed below the transporting and receiving surface 6, and a pushing mechanism 7 is arranged along the side of the supplying direction substantially perpendicular thereto.

The partition mechanism 3 is operated such that the belt-like forward and rearward partition plates 3b and 3c are placed at the forward and rearward portions of the plate-like driven member 3a laterally installed below the transporting and receiving surface 6 in such a way that each of the forward and rearward inner surfaces is substantially flush with the rear surfaces of the right and left shutter plates 4a, 4a of the shutter mechanism 4, or the front surface of the lateral feeding plate 5a of the lateral feeding pusher mechanism 5, in a direction substantially perpendicular to the supplying direction and, at the same time, the air cylinder 3d for use in performing a vertical movement is cooperatively arranged below the driven member 3a. At the lower limit position of the driven member 3a having the rod of the air cylinder moved downwardly, the upper ends of the forward and rearward partition plates 3b and 3c are positioned below the transporting and receiving surface 6. At the upper limit position having the rod extended upwardly, the upper ends of the forward and rearward partition plates 3b and 3c are positioned below the transporting and receiving surface 6. At the upper limit position in which the rod is extended upward-

dly, only the forward and rearward partition plates 3b and 3c are projected upwardly from the transporting and receiving surface 6, and each of the upper ends is substantially flush with or slightly higher than the height of the group B₁ of the rod-like articles supplied onto the transporting and receiving surface 6.

The pusher mechanism 7 is made such that it is composed of a pusher plate 7a having a width in the supplying direction slightly less than an inner width between the forward and rearward partition plates 3b and 3c, and a height substantially the same as or slightly greater than the height of the group B₁ of rod-like articles to be supplied from a slightly higher position than the transporting and receiving surface 6. The pusher mechanism 7 further includes a lateral moving means such as an air cylinder for reciprocating the pusher plate 7a in a direction substantially perpendicular to the supplying direction by a predetermined amount. The outermost position of the pusher plate 7a, through the driving of the above-mentioned means, is at a location where the movement of the reversing frame 2a of the box distributing mechanism is not hindered. At the innermost position of pusher plate 7a, a spacing slightly greater than the length of the rod-like articles B is provided between the vertically arranged side wall plate 1b along one side of the supplying passage 1 and pusher plate 7a. It is contemplated that wall plate 1b could, if desired, be mounted for movement by an air cylinder, e.g., in conjunction with plate 7a, to effectively contain the rod-like articles substantially in the predetermined configuration they were in prior to discharge from storing box A. That is, prior to discharge, plate 1b would be positioned along an opposite side of receiving surface 6 from plate 7a and would be retracted across conveyor 1 as plate 7a is extended toward conveyor 1 at substantially the same speed.

The sequential operation of the second embodiment of the invention, described above, will now be explained.

First, similarly to the above-mentioned first embodiment the storing box A is loaded within and inverted by the box distributing mechanism 2. After the storing box A is thus inverted and transported onto the transporting and receiving surface 6, the opening and closing lids 2a₃, 2a₃ are opened. The box is then raised and returned to the feeding position by the box distributing mechanism 2, resulting in that simultaneous with this operation, the forward and rearward partition plates 3b and 3c are lifted to cause the group B₁ of the rod-like articles within the storing box A to be supported between the forward and rearward partition plates 3b and 3c, without substantially varying their predetermined configuration.

Upon confirmation of the completion of the upward movement of the forward and rearward partition plates 3b and 3c, the pusher plate 7a of the pushing pusher mechanism 7 is moved toward the supplying passage 1 and fitted between the forward and rearward partition plates 3b and 3c, and the group B₁ of the rod-like articles of one box on the transporting and receiving surface 6 are thereby pushed onto the supplying passage 1. If desired, as mentioned above, side wall plate 1b could be moved to engage an opposite side of the group B₁ of rod-like articles and thereafter be retracted as pusher plate 7a is extended to thereby maintain the group in its predetermined configuration.

At this time, the group B₁ of rod-like articles is moved such that its front end surface is moved from the rear surface of the forward partition plate 3b to the rear surfaces of the right and left shutter plates 4a, 4a, and its rear end surface is moved from the front surface of the rearward partition plate 3c to the front surface of the lateral transporting plate 5a. Since it is guided by these elements, the piled-up condition of the group B₁ of rod-like articles is not substantially varied. When the pusher plate 7a reaches its inner limit position, however, the group B₁ of rod-like articles is completely transferred from the transporting and receiving surface 6 onto the supplying passage 1.

After it is confirmed that the movement of the pusher plate 7a is completed, the right and left shutter plates 4a, 4a are opened in the same manner as that of the first embodiment, while the pusher plate 7a is maintained at the innermost position to cause the rod-like articles B₂ in the storing device C to be connected with the rod-like articles B₁ positioned rearwardly of the plates 4a, 4a. Thereafter, the groups B₁ and B₂ of rod-like articles are laterally moved by the belt conveyor and the lateral feeding plate 5a of the supplying passage 1 and transported and supplied into the storing device C. The right and left shutter plates 4a, 4a are then closed and each of the lateral feeding plate 5a, pusher plate 7a, and the forward and rearward partition plates 3b and 3c are returned to their original positions.

The present invention, as described above, has the following advantages. The rod-like article storing box is transported from the feeding, or receiving, position by the box distributing mechanism to its inverted condition and held at the supplying passage or at the transporting and receiving surface in its inverted form. Thereafter, the storing box is raised and returned to the feeding position and, at substantially the same time, the forward and rearward partition plates are raised in cooperation with the raising of the storing box. Thereby, the group of rod-like articles within the box is sup-

ported on the supplying passage or on the discharging and receiving surface without substantially varying their predetermined configuration. The forward and rearward partition plates are laterally moved in a forward direction, and the lateral feeding pusher is advanced or, alternatively, the front end surface of the group of rod-like articles approaches the shutter plate under a pushing operation across the supplying direction by the pusher, and the rear end surface of the group of rod-like articles approaches the lateral feeding pusher. Thereby, the group of rod-like articles is supported between the shutter plates and the lateral feeding pusher while being maintained in said predetermined configuration. Then the forward and rearward partition plates descend to cause them to be fed in together or directly fed in with the lateral feeding pusher, so that any type of storing box can be used without regard to the presence or absence of any projections at its outer side surface. Since the empty box is returned, it is not necessary to install an empty box discharging mechanism. Accordingly, the device can be simplified and the entire device can be made relatively small in size.

Claims

1. A method of conveying articles comprising:
 - (a) receiving a group of rod-like articles (B) in a predetermined configuration in a storage container (A) at a receiving location;
 - (b) moving said group of articles (B) in said predetermined configuration in said storage container (A) from said receiving location to a discharging location proximate a supply passage by inverting the container;
 - (c) discharging said group of articles (B) from said storage container (A) at said discharging location by raising the container so that the articles fall in a block therefrom; and
 - (d) conveying said group of articles (B) in a direction along said supply passage (1) while substantially maintaining said group of articles (B) in said predetermined configuration, characterised by
 - (e) containing said group of articles (B) substantially in said predetermined configuration as said group of articles (B) is discharged from said storage container by raising front and rear partition members (3b, 3c) such as plates, which are spaced by the width of the block, simultaneously with the raising of the container.
2. The method of Claim 1, characterised in that said articles (B) are rod-like articles having substantially uniform lengths, wherein said step

of conveying further comprises conveying said group of rod-like articles (B) in a direction substantially perpendicular to said lengths of said rod-like articles (B).

- 5 3. The method of Claim 1 or 2, characterised in that said step of moving by inverting said storage container (A) between said receiving location and said discharging location, is carried out by a distributing mechanism (2) arranged substantially perpendicularly to the supplying passage (1).
- 10 4. The method of Claim 2 or 3, further characterised by the steps of advancing said group of articles (B) along said supply passage (1) by means of said partition plates (3b, 3c) to a predetermined location, blocking further advancing of said group of articles by means of a shutter mechanism (4), and lowering said partition members (3b, 3c) from said supply passage (1).
- 15 5. The method of Claim 4, further characterised by the step of opening said shutter mechanism (4) to permit further advancing of said group of articles (B) beyond said shutter mechanism (4).
- 20 6. The method of Claim 1, 2 or 3 further characterised by the step of transferring said group of articles (B) in said predetermined configuration from between said partition plates (3b, 3c) substantially transversely onto said supply passage (1).
- 25 7. The method of any of Claims 1 to 6 further characterised by the step of returning said storage container (A), after discharging said group of articles therefrom, to said receiving location.
- 30 8. A method according to Claim 1, characterised in that said container (A) is a storing box having an open top surface, and said method includes inverting said storing box (A) and moving said storing box (A) in said inverted position in a substantially vertical direction to said supply passage (1) which communicates with a storing device through a shutter plate (4), which can be opened or closed across said supplying passage (1) performing said raising of the front and rear partition plates (3b, 3c) simultaneously with said raising of said storing box (A) to thereby support said group of rod-like articles (B) from said box without substantially varying said predetermined configuration, thereafter moving said front and rear
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partition plates (3b, 3c) in a forward supplying direction by a desired and predetermined distance to cause the front end surfaces of said group of rod-like articles (B) to become substantially adjacent said shutter plate (4), advancing a pusher (5) by a desired and predetermined distance to a position proximate a rear end surface of said group of rod-like articles, thereafter lowering said front and rear partition plates (3b, 3c) simultaneously with opening said shutter plate (4) to cause said group of rod-like articles on said supplying passage (1) to be moved in a direction substantially perpendicular to a longitudinal direction in which said group of rod-like articles (B) extend, thereby performing said conveying step which transports said rod-like articles (B) into said storing device.

9. A method according to Claim 1 characterised in that said container (A) is a storing box having an open upper surface and said method comprises inverting said storing box (A) and moving said storing box in said inverted position in a substantially vertical direction to a transporting and receiving surface (1a) which is substantially flush with and parallel to the supply passage (1) which communicates with a storing device through a shutter plate (4) which can be opened or closed, performing said raising of the front and rear partition plates (3b, 3c) simultaneously with said raising said storing box (A) to thereby cause said group of rod-like articles within said box (A) to be supported without substantially varying said predetermined configuration, thereafter moving said group of rod-like articles of said storing box (A) substantially horizontally in a substantially longitudinal direction substantially perpendicular to a direction in which said rod-like articles lie, by a desired and predetermined distance by a pusher (5), and in such a way that the front end surface of said group of rod-like articles is close to said shutter plate (4) and the rear end surface is close to said feeding pusher (5), respectively, and performing said conveying by transporting said group of rod-like articles (B) by the lateral feeding pusher (5) which transports the articles into said storing device.

10. An apparatus for conveying a group of rod-like articles (B) comprising:

- (a) a supply passage (1) along which said group of articles (B) is conveyed in a first direction;
- (b) means (2) for (i) receiving a group of said articles in a predetermined configuration in a storage container (A), (ii) moving

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said group of articles (B) in said predetermined configuration in said storage container (A) from a receiving position to a discharging position by inverting the container, said discharging position being proximate said supply passage (1), and (iii) raising the container to cause the group of articles to fall in therefrom at said discharging station in a block defining said predetermined configuration;

(c) front and rear partition members (3b, 3c) such as plates for containing said group of articles (B) substantially in said predetermined configuration; characterised by

(d) means (3d) adapted to raise said front and rear partition members (3b, 3c) simultaneously with the raising of the storage container (A) for containing said group of articles (B) substantially in said predetermined configuration as said group of articles (B) is discharged from said container (A).

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11. The apparatus of Claim 10, characterised in that in said receiving position, said container (A) has an upwardly facing opening, and wherein said means (2) for (i) receiving, (ii) moving, and (iii) raising further comprises means 2_{a3}) for (iv) for releasing said group of articles from said storage container and withdrawing said storage container from said discharging position in a predetermined direction.

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12. The apparatus of Claim 11 characterised in that said supply passage (1) has a support surface (1), wherein said front and rear partition members 3b, 3c) are mounted for movement from below said support surface (1) to above said support surface (1), and means (5) for moving said articles in said first direction.

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13. The apparatus of Claim 12, characterised in that said supply passage (1) further comprises a plurality of side-by-side spaced apart support surfaces (1) and wherein said front plate (3b) and said rear plate (3c) are arranged for raising movement between a pair of said support surfaces (1).

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14. The apparatus of any of Claims 10 to 12 characterised by a receiving surface for receiving said group of articles at said discharging position wherein said front and rear plates (3b, 3c) are movable upwardly to contain said group of articles in said predetermined configuration on said receiving surface.

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15. The apparatus of Claim 14, characterised by means (2) for transferring said group of articles

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EP 0 334 115 B1

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in said predetermined configuration from said receiving surface to said supply passage.

16. The apparatus of Claim 14 or 15 characterised by means (5) for conveying said group of articles (B) along said supply passage (1) in said first direction. 5

17. The apparatus of Claim 16 characterised in that said means (5) for conveying comprise a pusher (5) for exerting a force against said articles (B). 10

18. The apparatus of Claim 17, characterised in that said means (1) for conveying further comprises a powered conveyor supporting said articles from below. 15

19. The apparatus of Claim 17 characterised by a support surface across which said pusher conveys said articles (B). 20

20. The apparatus of Claim 10 characterised by means (4) for blocking movement of said articles along said supply passage (1), mounted for movement between a blocking position and an open position at which position said articles (B), are permitted to move along said supply passage (1). 25

21. An apparatus according to Claim 10, characterised in that the supply passage (1) communicates with an inlet end of a storing device extending laterally and including a box distributing mechanism (2) for inverting and transferring the container (A) in the form of a rod-like article storing box having an open upper surface and being movably arranged from a feeding position which is the receiving position to an inverted position which is the discharging position, and further movable in said inverted position in a direction substantially perpendicular to a feeding direction which is said first direction in which said rod-like articles are loaded into said storing box at said feeding position, said front and rear partition plates (3b, 3c) substantially vertically reciprocably arranged below said supply passage (1) to which said storing box (A) is moved in said inverted position in such a way that they can be moved to be substantially flush with each of front and rear inner surfaces of said storing box (A), a shutter mechanism (4) which can be opened or closed in traversing said supplying passage (1) at substantially a right angle with said supplying direction, arranged downstream of said rod-like articles on said supply passage (1), and a lateral feeding pusher mechanism (5) 30

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mounted for reciprocation toward said shutter mechanism (4) from a position upstream of said group of rod-like articles (B).

22. An apparatus according to Claim 10 characterised by a transporting and receiving surface (6) substantially parallel with the supply passage (1) which is laterally positioned at an inlet end of a storing device and arranged substantially flush with said supplying passage (1), a box distributing mechanism (2) for inverting and transporting a rod-like article storing box which is said container, having an open upper surface and being reciprocably arranged from the receiving position to an inverted position which is the discharging position and further movable in said inverted position, the front and rear plates (3b, 3c) being part of a partition mechanism installed substantially vertically and reciprocably arranged below said transporting and receiving surface where said storing box (B) is supplied in its inverted condition in such a way that they are substantially flush with front and rear inner surfaces of said box (A), and wherein a pusher (7) slightly smaller than the inner width between said front and rear partition plates is reciprocably arranged to displace the articles from said transporting and receiving surface onto said supplying passage in a direction substantially perpendicular to said supplying passage (1), a shutter mechanism (4) which can be opened or closed is arranged in a direction substantially perpendicular to said supplying passage (1), arranged downstream of said group of rod-like articles on said supplying passage, and a lateral feeding pusher mechanism (5) which can be reciprocated from a position upstream of said rod-like articles toward said shutter mechanism.

23. An apparatus according to Claim 10 characterised by:
 a container distributing mechanism (2), the said container distributing mechanism further comprising an inverting device attached to a transporting device for moving said container between a position which is said receiving position and the discharging position adjacent said supply passage (1), said container (A) being inverted in said discharging position; and
 a container mechanism including said front and rear plates (3b, 3c) and having predetermined dimensions for containing said articles in said predetermined configuration at said discharging position and for permitting said container (A) to be returned to said feeding position, said containing mechanism comprising a lateral feeding mechanism (7) located adjacent

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EP 0 334 115 B1

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said supply passage (1) which is defined by a supply conveyor (1) upstream of said rearward end of said configuration in said first direction of movement for moving said articles in said first direction of movement.

24. The apparatus of Claim 23 characterised by a transporting mechanism (E) for moving containers into said feeding position.

25. The apparatus for Claim 24 characterised in that said transporting mechanism comprises a pusher (E1) for pushing said containers into said feeding position.

26. The apparatus of Claim 25 characterised in that said transporting mechanism further comprises an engaging claw (E4) mounted for movement on said pusher (E1) for engagement with and disengagement from a hook element (A3) of said container (A).

27. The apparatus of Claim 23 characterised in that said inverting device (2) comprises an upwardly facing open side in said feeding position, and a selectively actuatable lid (2_{a3}, 2_{a3}) extending over at least a portion of said open side.

28. The apparatus of Claim 27 characterised in that said transporting device (2) is configured to move said inverting device sequentially from said feeding position upwardly to an upper extreme position and downwardly therefrom, such that said open side is downwardly facing, to said discharging position.

29. The apparatus of Claim 23 characterised by a driven member (3a) connecting said forward and rearward plates (3b, 3c) and adapted to support said articles discharged at said discharging position.

30. The apparatus of Claim 29, characterised in that said driven member (3a) comprises a receiving surface for supporting said articles (B) and movable between a supporting position slightly above an upper surface of said supply conveyor (1) and a retracted position in which said forward and rearward partition plates (3b, 3c) are below said upper surface of said supply conveyor (1).

31. The apparatus of Claim 30 characterised by a first drive apparatus (3d) operatively associated with said driven member (3a) to move said driven member in a substantially vertical direction between said supporting position and said

retracted position.

32. The apparatus of Claim 31 characterised by a second drive apparatus (3e) operatively associated with said driven member (3a) to move said driven member (3a) substantially in said predetermined direction of said supply passage (1) from a receiving position to an advanced position proximate said forward partition plate of said partition mechanism (4).

33. The apparatus of Claim 23, characterised in that said containing mechanism further comprises at least one selectively movable side plate (1a) positioned along side said supply passage (1).

34. The apparatus of Claim 23 characterised in that said containing mechanism further comprises a selectively movable side plate (1a) positioned on either side of said supply passage (1).

35. The apparatus of Claim 23 characterised by a shutter mechanism (4) located along said supply passage (1) downstream of said forward end of said predetermined configuration in said predetermined direction of said supply passage (1), in said discharging position, for blocking advancement of said articles (B) along said supply passage (1).

36. The apparatus of Claim 35 characterised in that said shutter mechanism (4) comprises a shutter plate (4a) mounted on either side of said supply conveyor (1) for reciprocation between a closed position in which said shutter plates (4a) are spaced apart a distance less than the length of one said rod-like articles (B) and an open position in which said shutter plates (4a) are spaced apart a distance greater than the length of one of said rod-like articles (B).

37. The apparatus of Claim 23 characterised by a drive apparatus (5e) for driving said supply conveyor (1), a drive apparatus (5b) for driving said lateral feeding mechanism, and an apparatus for driving said supply conveyor and said lateral feeding mechanism at substantially the same speed.

38. The apparatus of Claim 37, characterised in that said drive apparatus for said lateral feeding mechanism and said drive apparatus for said supply conveyor share a common drive motor (5e).

29

EP 0 334 115 B1

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39. The apparatus of Claim 38 characterised in that said drive apparatus for said supply conveyor includes a clutch to stop movement of said supply conveyor during predetermined times.

40. The apparatus of Claim 39 characterised in that said lateral feeding mechanism (5) comprises a reciprocal member (5) for advancing said articles in the direction of movement of said supply conveyor (1) and wherein said predetermined times at which said clutch stops movement of said supply conveyor (1) occur during retraction of said reciprocal member (5) in a direction substantially opposite to the direction of movement of said supply conveyor (1).

41. The apparatus of Claim 23 characterised in that said lateral feeding mechanism (5) comprises a lateral feeding plate (5) for engaging said rearward end of said configuration of said rod-like articles (B), having a width transverse to said predetermined direction of said supply passage (1) less than the length of one of said rod-like articles (B).

42. The apparatus of Claim 41 characterised in that said supply conveyor (1) comprises a plurality of side-by-side conveying elements (1), at least two of which are spaced apart a predetermined amount, wherein said containing mechanism comprises a partition mechanism which includes the upwardly projecting forward partition plate (3b) for engaging a downstream end of said predetermined configuration of articles (B), and the upwardly projecting rearward partition plate (3c) for engaging an upstream end of said predetermined configuration of articles, and a laterally extending driven member (3a) having an upper support surface for said rod-like articles, said driven member (3a) connecting said forward partition plate (3b) and said rearward partition plate (3c) at respective lower ends of said partition plates (3b, 3c), said partition mechanism being operable to move between a retracted position beneath an upper surface of said supply passage (1) to a support position wherein said forward partition plate (3b), said rearward partition plate (3c), and said upper support surface of said driven member (3a) extend between two of said plurality of side-by-side conveying elements (1) to contain said rod-like articles in substantially said predetermined configuration.

43. The apparatus of Claim 42, characterised in that said partition mechanism is operable to move said rod-like articles in substantially said predetermined configuration in substantially said first direction.

5 44. The apparatus of Claim 43 characterised by a shutter mechanism (4) located along said supply passage (1) downstream of said forward end of said predetermined configuration in said first direction in said discharge position, wherein said partition mechanism (4) is operable to move said rod-like articles (B) to a position substantially adjacent said shutter mechanism (4), whereby said shutter mechanism (4) blocks movement of said rod-like articles in said first direction.

10 45. The apparatus of Claim 44 characterised in that said conveying elements (1) are driven for movement, and wherein said shutter mechanism (4) is movable between a blocking position and an open position, and wherein in said open position said feeding mechanism (5) and said conveying elements (1) move substantially at the same speed in said first direction to advance said rod-like articles from said discharge position.

15 46. The apparatus of Claim 45, characterised by a storage device communicating with said supply passage downstream of said discharging position of said rod-like articles such that said rod-like articles are advanced toward said storage device.

20 47. The apparatus of Claim 42 characterised in that said rearward partition plate (3c) comprises a pair of rearward partition plates (3c) spaced apart a distance greater than said width of said lateral feeding plate (5) to permit said lateral feeding plate (5) to extend between said pair of rearward partition plates (3c) to engage said rearward end of said predetermined configuration of articles (B).

25 48. The apparatus of Claim 23 characterised by a relatively stationary receiving surface (6) for receiving said articles (B) in said predetermined configuration at said discharging position, and a transfer mechanism (7) for transferring said articles in said predetermined configuration to said supply passage (1).

30 49. The apparatus of Claim 48 characterised in that said supply passage (1) has an upper support surface and wherein said receiving surface (6) is substantially flush with said upper support surface, and wherein said transfer mechanism comprises a pushing mechanism

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EP 0 334 115 B1

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(7) for pushing said articles (B) in said predetermined configuration across said receiving surface (6) onto said upper support surface of said supply passage (1).

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50. The apparatus of Claim 49 characterised in that said pushing mechanism (7) comprises a pusher plate (7) mounted for movement across said receiving surface as said articles are pushed across said receiving surface to a position alongside said supply passage (1) to thereby function as a guide as said articles in said predetermined configuration are moved along said supply passage in said first direction, and further comprising a side wall plate (1b) positioned along an opposite side of said supply passage (1) from said pusher plate (7).

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51. The apparatus of Claim 50 characterised in that said side wall plate (1a) is mounted for movement in conjunction with and at substantially the same speed as said pusher plate (7) of said transfer mechanism (7) to maintain a spacing therebetween slightly wider than the length of one of said articles (B) to maintain said articles in said predetermined configuration during transfer.

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Patentansprüche

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1. Verfahren zum Fördern von Gegenständen, aufweisend:

- (a) Aufnahme einer Gruppe von stabförmigen Gegenständen (B) in einer vorbestimmten Konfiguration in einem Speicherbehälter (A) an einem Aufnahmestandort;
- (b) Bewegung der Gruppe von Gegenständen (B) in der vorbestimmten Konfiguration in dem Speicherbehälter (A) von dem Aufnahmestandort zu einem Abgabestandort in Nähe einer Zuführpassage durch Umdrehung des Behälters;
- (c) Abgabe der Gruppe von Gegenständen (B) von dem Speicherbehälter (A) an dem Abgabestandort durch Anheben des Behälters, so daß die Gegenstände in einem Block herausfallen; und
- (d) Fördern der Gruppe von Gegenständen (B) in einer Richtung entlang der Zuführpassage, während diese Gruppe von Gegenständen (B) im wesentlichen in der vorbestimmten Konfiguration gehalten wird, gekennzeichnet durch
- (e) Halten dieser Gruppe von Gegenständen (B) im wesentlichen in der vorbestimmten Konfiguration, wenn diese Gruppe von Gegenständen (B) aus dem Speicherbehälter abgegeben wird, durch Anhebung von vor-

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2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Gegenstände (B) stabförmige Gegenstände sind, die im wesentlichen eine gleiche Länge aufweisen, wobei der Schritt des Förderns ferner umfaßt das Fördern dieser Gruppe von stabförmigen Gegenständen (B) in einer Richtung im wesentlichen senkrecht zu den Längen der stabförmigen Gegenstände (B).

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3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Schritt der Bewegung durch Umkehrung des Speicherbehälters (A) zwischen dem Aufnahmestandort und dem Abgabestandort ausgeführt wird, indem ein Verteilmechanismus (2) im wesentlichen senkrecht zu der Zuführpassage (1) angeordnet ist.

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4. Verfahren nach Anspruch 2 oder 3 ferner gekennzeichnet durch die Schritte des Vorschubs der Gruppe von Gegenständen (B) entlang der Zuführpassage (1) mittels der Unterteilungsplatten (3b, 3c) an einen vorbestimmten Ort, Blockieren des weiteren Vorschubs der Gruppe von Gegenständen mittels eines Verschlußmechanismus (4) und Absenkung der Unterteilungselemente (3b, 3c) von der Zuführpassage (1).

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5. Verfahren nach Anspruch 4, ferner gekennzeichnet durch den Schritt des Öffnens des Verschlußmechanismus (4), um einen weiteren Vorschub der Gruppe von Gegenständen (B) hinter den Verschlußmechanismus (4) zu gestatten.

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6. Verfahren nach Anspruch 1, 2 oder 3, ferner gekennzeichnet durch den Schritt des Transfers der Gruppe von Gegenständen (B) in der vorbestimmten Konfiguration aus den Unterteilungsplatten (3b, 3c) heraus im wesentlichen quer auf die Zuführpassage (1).

7. Verfahren nach irgendeinem der Ansprüche 1-6, ferner gekennzeichnet durch den Schritt der Rückführung des Speicherbehälters (A) nach Abgabe der Gruppe von Gegenständen aus diesem zu dem Aufnahmestandort.

8. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Behälter (A) eine Speicherbox ist mit einer offenen oberen Oberfläche

und daß das Verfahren umfaßt die Umkehrung der Speicherbox (A) und die Bewegung der Speicherbox (A) in diese umgekehrte Position in einer im wesentlichen vertikalen Richtung zu der Zuführpassage (1), welche mit einer Speichereinrichtung über eine Verschlußplatte (4) in Verbindung steht, welche geöffnet oder geschlossen werden kann über der Zuführpassage (1), Ausführung der Anhebung der vorderen und hinteren Unterteilungsplatten (3b, 3c) gleichzeitig mit dem Anheben der Speicherbox (A), um hierdurch die Gruppe von stabförmigen Gegenständen (B) aus der Box abzustützen, ohne die vorbestimmte Konfiguration wesentlich zu ändern, anschließend Bewegung der vorderen und hinteren Unterteilungsplatten (3b, 3c) in einer Vorwärts-Zuführrichtung um eine gewünschte und vorbestimmte Entfernung, um die vordären Endflächen der Gruppe von stabförmigen Gegenständen (B) im wesentlichen in Nachbarschaft zu der Verschlußplatte (4) zu bringen, Vorschub eines Stößels (5) um eine gewünschte und vorbestimmte Entfernung in eine Position in Nähe einer hinteren Endfläche der Gruppe von stangenförmigen Gegenständen, anschließende Absenkung der vorderen und hinteren Unterteilungsplatten (3b, 3c) gleichzeitig mit der Öffnung der Verschlußplatte (4), um die Gruppe von stabförmigen Gegenständen auf der Zuführpassage (1) in einer Richtung im wesentlichen senkrecht zu einer Längsrichtung zu bewegen, in die sich die Gruppe von stabförmigen Gegenständen (B) erstreckt, wodurch der Förderschritt ausgeführt wird, der die stabförmigen Gegenstände (B) in die Speichereinrichtung transportiert.

9. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Behälter (A) eine Speicherbox ist, die eine offene obere Oberfläche aufweist und daß das Verfahren umfaßt die Umkehrung der Speicherbox (A) und die Bewegung dieser Speicherbox in die umgekehrte Position in einer im wesentlichen vertikalen Richtung zu einer Transport- und Aufnahmoberfläche (1a), welche im wesentlichen bündig mit und parallel zu der Zuführpassage (1) ist, die mit einer Speichereinrichtung über eine Verschlußplatte (4) in Verbindung steht, die geöffnet oder geschlossen werden kann, Ausführung der Anhebung der vorderen und hinteren Unterteilungsplatten (3b, 3c) gleichzeitig mit dem Anheben der Speicherbox (A), um hierdurch die Gruppe von stabförmigen Gegenständen innerhalb der Box (A) abzustützen, ohne im wesentlichen die vorbestimmte Konfiguration zu verändern, anschließende Bewegung der Gruppe von stabförmigen Gegen-

ständen der Speicherbox (A) im wesentlichen horizontal in einer im wesentlichen Längsrichtung und im wesentlichen senkrecht zu einer Richtung, in der die stabförmigen Gegenstände liegen, um eine gewünschte und vorbestimmte Entfernung durch einen Stöbel (5) und in einer solchen Weise, daß die vordere Endoberfläche dieser Gruppe von stabförmigen Gegenständen nahe zu der Verschlußplatte (4) ist und die hintere Endoberfläche nahe zu dem Zuführstöbel (5) ist, und Ausführung des Förderns durch Transport dieser Gruppe von stabförmigen Gegenständen (B) durch den seitlichen Zuführstöbel (5), welcher die Gegenstände in die Speichereinrichtung transportiert.

10. Vorrichtung zum Fördern einer Gruppe von stabförmigen Gegenständen (B), aufweisend:

- (a) eine Zuführpassage (1), entlang welcher diese Gruppe von Gegenständen (B) in einer ersten Richtung gefördert wird;
- (b) Einrichtungen (2) zum (i) Empfang einer Gruppe dieser Gegenstände in einer vorbestimmten Konfiguration in einem Speicherbehälter (A), (ii) Bewegung dieser Gruppe von Gegenständen (B) in der vorbestimmten Konfiguration in dem Speicherbehälter (A) von einer Aufnahmeposition in eine Abgabeposition durch Umkehrung des Behälters, wobei die Abgabeposition in der Nähe der Zuführpassage (1) ist, und (iii) Anhebung des Behälters, um die Gruppe von Gegenständen zum Herausfallen zu veranlassen an der Abgabestation in einem Block, der die vorbestimmte Konfiguration definiert;
- (c) vordere und hintere Unterteilungselemente (3b, 3c), wie beispielsweise Platten, zum Beibehalten der Gruppe von Gegenständen (B) im wesentlichen in der vorbestimmten Konfiguration; gekennzeichnet durch
- (d) eine Einrichtung (3d), geeignet zur Anhebung der vorderen und hinteren Unterteilungselemente (3b, 3c) gleichzeitig mit dem Anheben des Speicherbehälters (A) zur Beibehaltung der Gruppe von Gegenständen (B) wesentlich in der vorbestimmten Konfiguration, wenn diese Gruppe von Gegenständen (B) aus dem Behälter (A) abgegeben wird.

11. Vorrichtung nach Anspruch 10, dadurch gekennzeichnet, daß in der Aufnahmeposition der Behälter (A) eine nach oben gerichtete Öffnung aufweist und wobei die Einrichtung (2) zum (i) Aufnehmen, (ii) Bewegen, und (iii) Anheben, ferner Einrichtungen (2_{a3}) umfaßt, um (iv) diese

Gruppe von Gegenständen aus dem Speicherbehälter freizugeben und den Speicherbehälter aus der Abgabeposition in eine vorbestimmte Richtung zurückzuziehen.

12. Vorrichtung nach Anspruch 11, dadurch gekennzeichnet, daß die Zuführpassage (1) eine Stützfläche (1) aufweist, wobei die vorderen und hinteren Unterteilungselemente (3b, 3c) zur Bewegung von unterhalb der Stützfläche (1) nach oberhalb der Stützfläche (1) angeordnet sind und daß Einrichtungen (5) zur Bewegung der Gegenstände in der ersten Richtung angeordnet sind. 5

13. Vorrichtung nach Anspruch 12, dadurch gekennzeichnet, daß die Zuführpassage (1) ferner mehrere Seite an Seite angeordnete und beabstandete Stützflächen (1) aufweist, wobei die vordere Platte (3b) und die hintere Platte (3c) für eine Anhebebewegung zwischen einem Paar dieser Stützflächen (1) angeordnet sind. 10

14. Vorrichtung nach irgendeinem der Ansprüche 10-12, gekennzeichnet durch eine Aufnahmeoberfläche für die Aufnahme der Gruppe von Gegenständen an der Abgabeposition, wobei die vorderen und hinteren Platten (3b, 3c) nach oben beweglich sind, um die Gruppe von Gegenständen in der vorbestimmten Konfiguration auf der Aufnahmeoberfläche beizubehalten. 15

15. Vorrichtung nach Anspruch 14, gekennzeichnet durch Einrichtungen (2) für den Transfer der Gruppe von Gegenständen in der vorbestimmten Konfiguration von der Aufnahmeoberfläche zu der Zuführpassage. 20

16. Vorrichtung nach Anspruch 14 oder 15, gekennzeichnet durch Einrichtungen (5) zum Fördern dieser Gruppe von Gegenständen (B) entlang der Zuführpassage (1) in der ersten Richtung. 25

17. Vorrichtung nach Anspruch 16, dadurch gekennzeichnet, daß die Einrichtungen (5) zum Fördern einen Stößel (5) aufweisen zur Ausübung einer Kraft gegen die Gegenstände (B). 30

18. Vorrichtung nach Anspruch 17, dadurch gekennzeichnet, daß die Einrichtung (1) zum Fördern ferner einen angetriebenen Förderer aufweist, der die Gegenstände von unten abstützt. 35

19. Vorrichtung nach Anspruch 17, gekennzeichnet durch eine Stützoberfläche, über die der Stößel die Gegenstände (B) fördert. 40

20. Vorrichtung nach Anspruch 10, gekennzeichnet durch Einrichtungen (4) zum Blockieren der Bewegung der Gegenstände entlang der Zuführpassage (1), die für eine Bewegung zwischen einer Blockierposition und einer geöffneten Position angeordnet sind, an welcher Position die Gegenstände (B) sich entlang der Zuführpassage (1) bewegen können. 45

21. Vorrichtung nach Anspruch 10, dadurch gekennzeichnet, daß die Zuführpassage (1) mit einem Einlaßende einer Speichereinrichtung in Verbindung steht, die sich seitlich erstreckt und einen Box-Verteilungsmechanismus (2) umfaßt zur Umkehrung und zum Transfer des Behälters (A) in der Form einer Speicherbox für stabförmige Gegenstände mit einer offenen oberen Oberfläche, die beweglich aus einer Zuführposition, welche die Aufnahmeposition ist, zu einer umgekehrten Position, welche die Abgabeposition ist, angeordnet ist und die ferner in der umgekehrten Position in einer im wesentlichen senkrechten Richtung zu einer Zuführrichtung beweglich ist, die die erste Richtung ist, in der die stabförmigen Gegenstände in die Speicherbox an der Zuführposition geladen werden, daß die vorderen und hinteren Unterteilungsplatten (3b, 3c) im wesentlichen vertikal hin- und hergehend unterhalb der Zuführpassage (1) angeordnet sind, zu welcher die Speicherbox (A) in der umgedrehten Position in einer solchen Weise bewegt wird, daß sie im wesentlichen bündig mit jeder der vorderen und hinteren inneren Oberflächen der Speicherbox (A) ist, daß ein Verschlußmechanismus (4) angeordnet ist, der geöffnet oder geschlossen werden kann und der die Zuführpassage (1) unter einem im wesentlichen rechten Winkel zu der Zuführrichtung traversiert und der stromabwärts der stabförmigen Gegenstände auf der Zuführpassage (1) angeordnet ist und daß ein seitlicher Zuführstöbelmechanismus (5) zur Hin- und Herbewegung zu dem Verschlußmechanismus (4) angeordnet ist an einer Position stromaufwärts der Gruppe von stabförmigen Gegenständen (B). 50

22. Vorrichtung nach Anspruch 10, gekennzeichnet durch eine Transport- und Aufnahmeoberfläche (6) im wesentlichen parallel zu der Zuführpassage (1), welche seitlich an einem Einlaßende einer Speichereinrichtung angeordnet ist und im wesentlichen bündig mit der Zuführpassage (1) ist, einem Box-Verteilungsmechanismus (2) zur Umkehrung und zum Transport einer stabförmigen Gegenstands-Speicherbox, welche der Behälter ist, mit einer oberen offenen Oberfläche und die hin- und herbeweglich aus 55

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EP 0 334 115 B1

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einer Aufnahmeposition in eine umgekehrte Position, welche die Abgabeposition ist, angeordnet ist, und die ferner in die umgekehrte Position bewegbar ist, wobei die vorderen und hinteren Platten (3b, 3c) Teil eines Unterteilungsmechanismus sind, der im wesentlichen vertikal installiert ist und hin- und herbeweglich unterhalb der Transport- und Aufnahmeoberfläche angeordnet ist, wobei die Speicherbox (B) in ihrem umgekehrten Zustand in einer solchen Weise zugeführt wird, daß sie im wesentlichen bündig mit der vorderen und hinteren Innenfläche der Box (A) ist und wobei ein Stößel (7), der geringfügig schmäler als die Innenbreite zwischen den vorderen und hinteren Unterteilungsplatten ist, hin- und herbeweglich angeordnet ist, um die Gegenstände von der Transport- und Aufnahmeoberfläche auf die Zuführpassage in einer Richtung im wesentlichen senkrecht zu der Zuführpassage (1) zu verschieben, ein Verschlußmechanismus (4), der geöffnet oder geschlossen werden kann, in einer Richtung im wesentlichen senkrecht zu der Zuführpassage (1), und der stromabwärts der Gruppe von stabförmigen Gegenständen angeordnet ist, und ein seitlicher Zuführ-Stößelmechanismus (5), der hin- und herbeweglich ist aus einer Position stromaufwärts der stabförmigen Gegenstände zu dem Verschlußmechanismus.

23. Vorrichtung nach Anspruch 10, gekennzeichnet durch:
 einen Behälter-Verteilmechanismus (2), wobei der Behälter-Verteilmechanismus ferner umfaßt eine Umkehrvorrichtung, die mit einer Transportvorrichtung verbunden ist, um den Behälter zwischen einer Position, welche die Empfangsposition ist, und der Abgabeposition zu bewegen, und die in Nachbarschaft zu der Zuführpassage (1) angeordnet ist, wobei der Behälter (A) in der Abgabeposition umgekehrt ist; und ein Behältermechanismus, der die vorderen und hinteren Platten (3b, 3c) umfaßt und eine vorbestimmte Dimension für die Aufnahme der Gegenstände in der vorbestimmten Konfiguration an der Abgabeposition besitzt und der die Rückführung des Behälters (A) in die Zuführposition gestattet, wobei der Behältermechanismus einen seitlichen Zuführmechanismus (7) umfaßt, der in Nachbarschaft der Zuführpassage (1) angeordnet ist, die durch einen Zuführförderer (1) stromaufwärts des hinteren Endes der Konfiguration in der ersten Bewegungsrichtung definiert ist, um die Gegenstände in der ersten Bewegungsrichtung zu bewegen.

24. Vorrichtung nach Anspruch 23, gekennzeichnet durch einen Transportmechanismus (E) für die Bewegung der Behälter in die Zuführposition.

5 25. Vorrichtung nach Anspruch 24, dadurch gekennzeichnet, daß der Transportmechanismus einen Stößel (E1) umfaßt zum Stoßen der Behälter in die Zuführposition.

10 26. Vorrichtung nach Anspruch 25, dadurch gekennzeichnet, daß der Transportmechanismus ferner eine Eingriffsklaue (E4) umfaßt, die angeordnet ist zur Bewegung auf dem Stößel (E1) zum Eingriff und zur Freigabe mit einem Hakenelement (A3) des Behälters (A)

15 27. Vorrichtung nach Anspruch 23, dadurch gekennzeichnet, daß die Umkehrvorrichtung (2) eine nach oben gerichtete offene Seite in der Zuführposition aufweist und daß sich eine selektiv betätigbare Klappe (2_{a3}, 2_{b3}) über wenigstens einen Teil der offenen Seite erstreckt.

20 28. Vorrichtung nach Anspruch 27, dadurch gekennzeichnet, daß die Transportvorrichtung (2) so ausgebildet ist, daß sie die Umkehrvorrichtung der Reihe nach von der Zuführposition nach oben in eine obere Extremposition und von da nach unten bewegt, so daß die offene Seite nach unten gerichtet ist zu der Abgabeposition.

25 29. Vorrichtung nach Anspruch 23, gekennzeichnet durch ein angetriebenes Element (3a), das die vorderen und hinteren Platten (3b, 3c) verbindet und in der Lage ist, die in der Abgabeposition abgegebenen Gegenstände abzustützen.

30 30. Vorrichtung nach Anspruch 29, dadurch gekennzeichnet, daß das angetriebene Element (3a) eine Aufnahmeoberfläche für die Abstützung der Gegenstände (B) umfaßt und zwischen einer Abstützposition geringfügig oberhalb einer oberen Oberfläche des Zuführförderers (1) und einer zurückgezogenen Position beweglich ist, in der die vorderen und hinteren Unterteilungsplatten (3b, 3c) unterhalb der oberen Oberfläche des Zuführförderers (1) sind.

35 31. Vorrichtung nach Anspruch 30, gekennzeichnet durch eine erste Antriebsvorrichtung (3d), die betriebsmäßig dem angetriebenen Element (3a) zugeordnet ist, um das angetriebene Element in einer im wesentlichen vertikalen Richtung zwischen der Abstützposition und der zurückgezogenen Position zu bewegen.

32. Vorrichtung nach Anspruch 31, gekennzeichnet durch eine zweite Antriebsvorrichtung (3e), die betriebsmäßig dem angetriebenen Element (3a) zugeordnet ist, um das angetriebene Element (3a) im wesentlichen in der vorbestimmten Richtung der Zuführpassage (1) von einer Aufnahmeposition zu einer fortgeschrittenen Position in der Nähe der vorderen Unterteilungsplatte des Unterteilungsmechanismus (4) zu bewegen.

33. Vorrichtung nach Anspruch 23, dadurch gekennzeichnet, daß der Behältermechanismus ferner wenigstens eine selektiv bewegliche Seitenplatte (1a) umfaßt, die längs der Zuführpassage (1) angeordnet ist.

34. Vorrichtung nach Anspruch 23, dadurch gekennzeichnet, daß der Behältermechanismus ferner eine selektiv bewegliche Seitenplatte (1a) umfaßt, die auf jeder Seite der Zuführpassage (1) angeordnet ist.

35. Vorrichtung nach Anspruch 23, gekennzeichnet durch einen Verschlußmechanismus (4), der entlang der Zuführpassage (1) stromabwärts des vorderen Endes der vorbestimmten Konfiguration in der vorbestimmten Richtung der Zuführpassage (1) in der Abgabeposition angeordnet ist, um den Vorschub der Gegenstände (B) entlang der Zuführpassage (1) zu blockieren.

36. Vorrichtung nach Anspruch 35, dadurch gekennzeichnet, daß der Verschlußmechanismus (4) eine Verschlußplatte (4a) umfaßt, die auf jeder Seite des Zuführförderers (1) zur Hin- und Herbewegung angeordnet ist zwischen einer geschlossenen Position, in der die Verschlußplatten (4a) um einen Abstand voneinander beabstandet sind, der kleiner als die Länge eines der stabförmigen Gegenstände (B) ist und einer offenen Position, in der die Verschlußplatten (4a) um einen Abstand voneinander beabstandet sind, der größer als die Länge eines der stabförmigen Gegenstände (B) ist.

37. Vorrichtung nach Anspruch 23, gekennzeichnet durch eine Antriebsvorrichtung (5e) für den Antrieb des Zuführförderers (1), eine Antriebsvorrichtung (5b) für den Antrieb des seitlichen Zuführmechanismus und eine Vorrichtung für den Antrieb des Zuführförderers und des seitlichen Zuführmechanismus mit im wesentlichen der gleichen Geschwindigkeit.

38. Vorrichtung nach Anspruch 37, dadurch gekennzeichnet, daß die Antriebsvorrichtung für

den seitlichen Zuführmechanismus und die Antriebsvorrichtung für den Zuführförderer einen gemeinsamen Antriebsmotor (5e) aufweisen.

5 39. Vorrichtung nach Anspruch 38, dadurch gekennzeichnet, daß die Antriebsvorrichtung des Zuführförderers eine Kupplung umfaßt, um die Bewegung des Zuführförderers während vorbestimmter Zeiten anzuhalten.

10 40. Vorrichtung nach Anspruch 39, dadurch gekennzeichnet, daß der seitliche Zuführmechanismus (5) ein hin- und hergehendes Element (5) umfaßt, um die Gegenstände in der Richtung der Bewegung des Zuführförderers (1) fortzubewegen und wobei die vorbestimmten Zeiten, in denen die Kupplung die Bewegung des Zuführförderers (1) anhält, während der Rückziehung des hin- und hergehenden Elements (5) in einer Richtung im wesentlichen entgegengesetzt zu der Bewegungsrichtung des Zuführförderers (1) auftreten.

15 41. Vorrichtung nach Anspruch 23, dadurch gekennzeichnet, daß der seitliche Zuführmechanismus (5) eine seitliche Zuführplatte (5) umfaßt für den Eingriff mit dem rückwärtigen Ende der Konfiguration der stabförmigen Gegenstände (B) und mit einer Breite quer zu der vorbestimmten Richtung der Zuführpassage (1), die geringer als die Länge eines der stabförmigen Gegenstände (B) ist.

20 42. Vorrichtung nach Anspruch 41, dadurch gekennzeichnet, daß der Zuführförderer (1) mehrere Seite an Seite angeordnete Förderelemente (1) aufweist, von denen wenigstens zwei um einen vorbestimmten Betrag beabstandet sind, wobei der Behältermechanismus einen Unterteilungsmechanismus umfaßt, welcher aufweist die sich nach oben erstreckende vordere Unterteilungsplatte (3b) zum Eingriff mit einem stromabwärtigen Ende der vorbestimmten Konfiguration von Gegenständen (B) und die sich nach oben erstreckende hintere Unterteilungsplatte (3c) zum Eingriff mit einem stromaufwärtigen Ende der vorbestimmten Konfiguration von Gegenständen, und ein sich seitlich erstreckendes angetriebenes Element (3a) mit einer oberen Stützfläche für die stabförmigen Gegenstände, wobei das angetriebene Element die vordere Unterteilungsplatte (3b) und die hintere Unterteilungsplatte (3c) an entsprechenden unteren Enden der Unterteilungsplatten (3b, 3c) verbindet und der Unterteilungsmechanismus betätigbar ist, um sich zwischen einer zurückgezogenen Position unter einer oberen Oberfläche der Zuführpassage

41

EP 0 334 115 B1

42

(1) zu einer Stützposition zu bewegen, wobei sich die hintere Unterteilungsplatte (3c) und die obere Stützfläche des angetriebenen Elementes (3a) zwischen zwei der mehreren Seite an Seite angeordneten Förderlementen (1) erstrecken, um die stabförmigen Gegenstände im wesentlichen in der vorbestimmten Konfiguration zu halten.

43. Vorrichtung nach Anspruch 42, dadurch gekennzeichnet, daß der Unterteilungsmechanismus betätigbar ist, um die stabförmigen Gegenstände im wesentlichen in der vorbestimmten Konfiguration im wesentlichen in der ersten Richtung zu bewegen.

44. Vorrichtung nach Anspruch 43, gekennzeichnet durch einen Verschlußmechanismus (4), der längs der Zuführpassage (1) stromabwärts des vorderen Endes der vorbestimmten Konfiguration in der ersten Richtung in der Abgabeposition angeordnet ist, wobei der Unterteilungsmechanismus (4) betätigbar ist, um die stabförmigen Gegenstände (B) in eine Position im wesentlichen in Nachbarschaft zu dem Verschlußmechanismus (4) zu bewegen, wobei der Verschlußmechanismus (4) die Bewegung der stabförmigen Gegenstände in der ersten Richtung blockiert.

45. Vorrichtung nach Anspruch 44, dadurch gekennzeichnet, daß die Förderelemente (1) zur Bewegung angetrieben sind und wobei der Verschlußmechanismus (4) zwischen einer Blockierposition und einer geöffneten Position beweglich ist und wobei in der geöffneten Position der Zuführmechanismus (5) und die Förderelemente (1) sich im wesentlichen mit der gleichen Geschwindigkeit in der ersten Richtung bewegen, um die stabförmigen Gegenstände aus der Abgabeposition fortzubewegen.

46. Vorrichtung nach Anspruch 45, gekennzeichnet durch eine Speichereinrichtung, die mit der Zuführpassage stromabwärts von der Abgabeposition der stabförmigen Gegenstände in Verbindung steht, so daß die stabförmigen Gegenstände zu der Speichereinrichtung fortbewegt werden.

47. Vorrichtung nach Anspruch 42, dadurch gekennzeichnet, daß die hintere Unterteilungsplatte (3c) ein Paar von hinteren Unterteilungsplatten (3c) umfaßt, die in einem Abstand beabstandet sind, der größer als die Breite der seitlichen Zuführplatte (5) ist, um der seitlichen Zuführplatte (5) eine Erstreckung zwischen dem Paar von hinteren Unterteilungsplatten (3c) für den Eingriff mit dem hinteren Ende der vorbestimmten Konfiguration von Gegenständen (B) zu gestatten.

5 48. Vorrichtung nach Anspruch 23, gekennzeichnet durch eine relativ stationäre Aufnahmeoberfläche (6) für die Aufnahme der Gegenstände (B) in der vorbestimmten Konfiguration in der Abgabeposition und einen Transfermechanismus (7) für den Transfer der Gegenstände in der vorbestimmten Konfiguration zu der Zuführpassage (1).

10 49. Vorrichtung nach Anspruch 48 dadurch gekennzeichnet, daß die Zuführpassage (1) eine obere Stützoberfläche aufweist und wobei die Aufnahmeoberfläche (6) im wesentlichen bündig mit der oberen Stützoberfläche ist und wobei der Transfermechanismus einen Stoßelmechanismus (7) umfaßt für das Stoßen der Gegenstände (B) in der vorbestimmten Konfiguration über die Aufnahmeoberfläche (6) auf die obere Stützoberfläche der Zuführpassage (1).

15 50. Vorrichtung nach Anspruch 49, dadurch gekennzeichnet, daß der Stoßelmechanismus (7) eine Stoßelplatte (7) umfaßt, die für eine Bewegung quer zu der Empfangsoberfläche angeordnet ist, wenn die Gegenstände quer zu der Empfangsoberfläche in eine Position längs der Zuführpassage (1) gestoßen werden, um hierdurch als eine Führung dieser Gegenstände in der vorbestimmten Konfiguration zu wirken, wenn diese entlang der Zuführpassage in der ersten Richtung bewegt werden, und ferner durch eine Seitenwandplatte (1a), die entlang der gegenüberliegenden Seite der Zuführpassage (1) gegenüber der Stoßelplatte (7) angeordnet ist.

20 51. Vorrichtung nach Anspruch 50, dadurch gekennzeichnet, daß die Seitenwandplatte (1a) für eine Bewegung zusammen mit und im wesentlichen mit der gleichen Geschwindigkeit wie die Stoßelplatte (7) des Transfermechanismus (7) angeordnet ist, um einen Abstand dazwischen beizubehalten, der geringfügig breiter als die Länge eines der Gegenstände (B) ist, um die Gegenstände in der vorbestimmten Konfiguration während des Transfers zu halten.

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Re vindications

1. Méthode de transport d'objets comprenant les phases de:
 - (a) réception d'un groupe d'objets (B) sous forme de tiges dans une structure prédéter-

minée dans un conteneur de stockage (A) à l'endroit de réception;

(b) le déplacement dudit groupe d'objets (B) dans ladite structure prédéterminée dans ledit conteneur de stockage (A) dudit endroit de réception vers un endroit de décharge voisin d'un passage d'alimentation en inversant le conteneur;

(c) déchargement dudit groupe d'objets (B) dudit conteneur de stockage (A) à l'endroit de déchargement en soulevant le conteneur pour que les objets tombent de là en bloc; et

(d) le transport dudit groupe d'objets (B) dans une direction, le long dudit passage d'alimentation (1) tout en maintenant sensiblement ledit groupe d'objets (B) dans ladite structure prédéterminée, caractérisée par

(e) mise en conteneur dudit groupe d'objets (B) sensiblement dans ladite configuration prédéterminée quand le dit groupe d'objets (B) est déchargé dudit conteneur de stockage (A) en soulevant des pièces de cloison avant et arrière (3b, 3c), telles que des plaques qui sont espacées de la largeur du bloc, en soulevant simultanément le conteneur.

2. Méthode suivant la revendication 1, caractérisée en ce que lesdits objets sont des objets sous forme de tiges ayant sensiblement des longueurs uniformes dans laquelle ladite phase de transport comprend encore le transport dudit groupe d'objets (B) dans une direction sensiblement perpendiculaire auxdites longueurs desdits objets sous forme de tiges.

3. Méthode suivant la revendication 1 ou 2, caractérisée en ce que ladite phase de déplacement en inversant ledit conteneur de stockage (A) entre ledit endroit de réception et ledit endroit de déchargement est réalisée par un mécanisme de distribution (2) disposé sensiblement perpendiculaire au passage d'alimentation (1).

4. Méthode suivant la revendication 2 ou 3, caractérisée encore par les phases de faire avancer ledit groupe d'objets (B) le long dudit passage d'alimentation (3b, 3c) vers un endroit prédéterminé, de bloquer encore l'avancement dudit groupe d'objets (B) au moyen d'un mécanisme de fermeture (4), et de faire descendre lesdites pièces de cloison (3b, 3c) dudit passage d'alimentation (1).

5. Méthode suivant la revendication 4, caractérisée encore par la phase d'ouverture dudit mécanisme de fermeture (4) pour permettre encore l'avancement dudit groupe d'objets (B) au-delà dudit mécanisme de fermeture.

6. Méthode suivant la revendication 1, 2 ou 3, caractérisée encore par la phase de transfert dudit groupe d'objets (B) dans ladite structure prédéterminée d'entre lesdites plaques de cloison (3b, 3c) d'une manière sensiblement transversale sur ledit passage d'alimentation.

7. Méthode suivant l'une des revendications 1 à 6, caractérisée par la phase de retourner ledit conteneur de stockage (A), après le déchargement dudit groupe d'objets (B) vers ledit endroit de réception.

8. Méthode suivant la revendication 1, caractérisée en ce que ledit conteneur (A) est une boîte de stockage qui a une surface du dessus ouverte, et ladite méthode comprend la phase d'inversion de ladite boîte de stockage (A) et la phase de déplacement de ladite boîte de stockage (A) dans ladite position inversée dans une direction sensiblement verticale (A) vers ledit passage d'alimentation qui communique avec le dispositif de stockage par une plaque de fermeture (4) qui peut être ouverte ou fermée en travers du passage d'alimentation réalisant ledit soulèvement des plaques de cloison avant et arrière (3b, 3c) simultanément avec ledit soulèvement de ladite boîte de stockage (A) pour ainsi supporter ledit groupe d'objets (B) partant de ladite boîte sans faire varier sensiblement sa structure prédéterminée, puis la phase de déplacer lesdites plaques de cloison avant et arrière (3b, 3c) dans une direction d'alimentation avant d'une distance voulue et prédéterminée pour faire que les surfaces d'extrémité avant dudit groupe d'objets (B) viennent sensiblement adjacentes à ladite plaque de fermeture (4), la phase d'avancer un pousseur (5) d'une distance voulue et prédéterminée vers un endroit voisin d'une surface d'extrémité arrière dudit groupe d'objets en forme de tiges, ensuite faisant descendre lesdites plaques de cloison avant et arrière (3b, 3c) en ouvrant simultanément ladite plaque de fermeture (4) pour entraîner que ledit groupe d'objets sur ledit passage d'alimentation (1) se déplace dans une direction pratiquement perpendiculaire à une direction longitudinale où s'étend ledit groupe d'objets (B), réalisant ainsi ladite phase de convoyage qui transporte lesdits objets (B) dans ledit dispositif de tri.

9. Méthode suivant la revendication 1, caractérisée en ce que ledit conteneur (A) est une boîte de stockage comportant une surface supérieure ouverte et en ce que ladite méthode comprend l'inversion de ladite boîte de stockage (A) et le déplacement de ladite boîte de stockage dans ladite position inversée dans une direction pratiquement verticale vers une surface de transport et de réception (1a) qui est pratiquement parallèle au niveau du passage d'alimentation (1) qui communique avec un dispositif de stockage à travers une plaque de fermeture (4) qui peut être ouverte ou fermée, réalisant ladite montée

des plaques de cloison avant et arrière (3b, 3c) simultanément à ladite montée de ladite boîte de stockage (A) pour ainsi faire supporter ledit groupe d'objets en forme de tiges dans ladite boîte (A) sans pratiquement faire varier ladite configuration prédéterminée; puis le déplacement dudit groupe d'objets en forme de tiges de ladite boîte de stockage (A) pratiquement horizontalement dans une direction pratiquement longitudinale pratiquement perpendiculaire à une direction dans laquelle sont lesdits objets en forme de tiges, d'une distance désirée et prédéterminée par un pousseur (5), et de telle manière que la surface d'extrémité avant dudit groupe d'objets en forme de tiges est fermée vers ladite plaque de fermeture (4) et la surface d'extrémité arrière est fermée vers ledit pousseur d'alimentation (5), respectivement, et la réalisation dudit convoyage en transportant ledit groupe d'objets (B) par ledit pousseur d'alimentation latéral (5) qui transporte les objets dans ledit dispositif de stockage.

10. Appareil de convoyage d'un groupe d'objets en forme de tiges (B) comprenant:

- (a) un passage d'alimentation (1) le long duquel est transporté ledit groupe d'objets (B) dans une première direction;
- (b) des moyens (2) pour (i) recevoir un groupe desdits objets dans une configuration prédéterminée dans un conteneur de stockage (A), (ii) le déplacement dudit groupe d'objets (B) dans ladite configuration prédéterminée dans ledit conteneur de stockage (A) provenant d'une position de réception vers une position de déchargement en inversant le conteneur, ladite position de décharge étant proche dudit passage d'alimentation (1), et (iii) l'élévation du conteneur pour en faire tomber le groupe d'objets audit poste de déchargement en un bloc définissant ladite configuration prédéterminée;
- (c) des pièces de cloison avant et arrière (3b, 3c) comme plaques pour contenir ledit groupe d'objets (B) pratiquement dans ladite configuration prédéterminée; caractérisé par
- (d) des moyens (3d) prévus pour faire monter lesdites pièces de cloison avant et arrière (3b, 3c) en même temps que monte le conteneur de stockage (A) pour contenir ledit groupe d'objets (B) pratiquement dans ladite configuration prédéterminée quand ledit groupe d'objets (B) est déchargé dudit conteneur (A).

11. Appareil suivant la revendication 10, caractérisé en ce que, dans ladite position de réception, ledit conteneur (A) comporte une ouverture tournée vers le haut, et dans lequel lesdits moyens (2) destinés à (i) recevoir, (ii) déplacer,

et (iii) faire monter, comprennent encore des moyens (2as) pour (iv) libérer ledit groupe d'objets dudit conteneur de stockage et enlever ledit conteneur de stockage de la position de déchargement dans une direction prédéterminée.

12. Appareil suivant la revendication 11, caractérisé en ce que ledit passage d'alimentation (1) comporte une surface support (1), dans lequel sont montés lesdites pièces de cloison avant et arrière (3b, 3c) pour un mouvement s'écartant du dessous de ladite surface support (1) vers le dessus de ladite surface support (1), et des moyens (5) sont prévus pour déplacer lesdits objets dans ladite première direction.

13. Appareil suivant la revendication 12, caractérisé en ce que ledit passage d'alimentation (1) comprend encore une pluralité de surfaces supports (1) côté à côté et espacées et dans lequel ladite plaque avant (3b) et ladite plaque arrière (3c) sont prévues pour un mouvement de montée entre une paire desdites surfaces supports (1).

14. Appareil suivant l'une des revendications 10 à 12, caractérisé par une surface de réception destinée à recevoir ledit groupe d'objets dans ladite position de déchargement dans laquelle lesdites plaques avant et arrière (3b, 3c) sont mobiles vers le haut pour contenir ledit groupe d'objets dans ladite configuration prédéterminée sur ladite surface de réception.

15. Appareil suivant la revendication 14, caractérisé par des moyens (2) pour transférer ledit groupe d'objets dans ladite configuration prédéterminée de ladite surface de réception audit passage d'alimentation.

16. Appareil suivant la revendication 14 ou 15, caractérisé par des moyens (5) pour convoyer ledit groupe d'objets (B) le long dudit passage d'alimentation (1) dans ladite première direction.

17. Appareil suivant la revendication 16, caractérisé en ce que lesdits moyens (5) de convoyage comprennent un pousseur (5) exerçant une force contre lesdits objets (B).

18. Appareil suivant la revendication 17, caractérisé en ce que lesdits moyens (1) de convoyage comprennent encore un convoyeur moteur supportant lesdits objets par dessous.

18. Appareil suivant la revendication 17, caractérisé par une surface support à travers laquelle ledit pousseur envoie lesdits objets (B).

20. Appareil suivant la revendication 10, caractérisé par des moyens (4) de blocage du mouvement desdits objets le long dudit passage d'alimentation (1), montés pour se déplacer entre une position de blocage et une position ouverte dans laquelle lesdits objets (B) peuvent se déplacer le long dudit passage d'alimentation (1).

21. Appareil suivant la revendication 20, caractérisé en ce que le passage d'alimentation (1) communique avec une extrémité d'entrée d'un dispositif de stockage dans le sens latéral et comprenant un mécanisme de distribution de boîte (2) pour inverser et transférer le conteneur (A) sous la forme d'une boîte de stockage d'objets en forme de tiges comportant une surface supérieure ouverte et prévue mobile à partie de la position d'alimentation qui est la position de réception vers une position inversée qui est la position de déchargement, encore mobile dans ladite position inversée dans une direction pratiquement perpendiculaire à la direction d'alimentation qui est ladite première direction dans laquelle lesdits objets en forme de tiges sont chargés dans ladite boîte de stockage dans ladite position d'alimentation, lesdites pièces de cloison avant et arrière (3b, 3c) disposées pratiquement verticales alternativement au-dessous dudit passage d'alimentation (1) auquel ladite boîte de stockage (A) est déplacée dans ladite position inversée de manière qu'ils puissent être déplacés pour être pratiquement au niveau de chacune des surfaces internes avant et arrière de ladite boîte de stockage (A), un mécanisme de fermeture (4) qui peut être ouvert ou fermé en travers dudit passage d'alimentation (1) à pratiquement angle droit avec ladite direction d'alimentation, disposé en aval desdits objets en forme de tiges sur ledit passage d'alimentation (1), et un mécanisme pousseur d'alimentation latéral (5) monté pour faire des mouvements alternatifs vers ledit mécanisme de fermeture (4) à partir d'une position en amont dudit groupe d'objets en forme de tiges (B).

22. Appareil suivant la revendication 10, caractérisé par une surface de transport et de réception (6) pratiquement parallèle au passage d'alimentation (1), qui est placée latéralement à l'extrémité d'entrée d'un dispositif de stockage et pratiquement au niveau dudit passage d'alimentation (1), un mécanisme de distribution de boîte (2) destiné à inverser et transporter une boîte de stockage d'objets en forme de tiges qui est ledit conteneur, comportant une surface supérieure ouverte et qui est disposée alternativement à partir de la position de réception vers une position inversée qui est la position de déchargement et encore mobile dans ladite position inversée, les plaques avant et arrière (3b, 3c) faisant partie d'un mécanisme de cloisonnement monté pratiquement vertical et disposé alternativement au-dessous de ladite surface de transport et de réception où ladite boîte de stockage (B) est envoyée dans son état inversé de manière qu'ils soient pratiquement au niveau des surfaces internes avant et arrière de ladite

boîte (A), et dans lequel un pousseur (7) légèrement plus petit que la largeur interne entre lesdites plaques de cloison avant et arrière est disposé alternativement pour déplacer les objets de ladite surface de transport et de réception sur ledit passage d'alimentation (1), un mécanisme de fermeture (4) qui peut être ouvert ou fermé est prévu dans une direction pratiquement perpendiculaire audit passage d'alimentation (1), en aval dudit groupe d'objets en forme de tiges sur ledit passage d'alimentation, et un mécanisme pousseur d'alimentation latéral (5) qui peut avoir un mouvement alternatif entre une position en amont desdits objets en forme de tiges et ledit mécanisme de fermeture.

23. Appareil suivant la revendication 10, caractérisé par:

un mécanisme de distribution de conteneur (2), qui comprend encore un dispositif d'inversion relié à un dispositif de transport pour déplacer ledit conteneur entre une position qui est ladite position de réception et la position de déchargement adjacente audit passage d'alimentation (1), ledit conteneur (A) étant inversé dans ladite position de déchargement; et

un mécanisme de conteneur comprenant lesdites plaques avant et arrière (3b, 3c) et ayant des dimensions prédéterminées pour contenir lesdits objets dans ledite configuration prédéterminée à ladite position de déchargement et pour permettre audit conteneur (A) d'être renvoyé à ladite position d'alimentation, ledit mécanisme de conteneur comportant un mécanisme d'alimentation latéral (7) situé près dudit passage d'alimentation (1) qui est défini par un convoyeur d'alimentation (1) en amont de ladite extrémité arrière de ladite configuration dans ladite première direction de mouvement pour déplacer lesdits objets dans ladite première direction de mouvement.

24. Appareil suivant la revendication 23, caractérisé par un mécanisme de transport (E) pour déplacer les conteneurs dans ladite position d'alimentation.

25. Appareil suivant la revendication 24, caractérisé en ce que ledit mécanisme de transport comporte un pousseur (E1) pour pousser lesdits conteneurs dans ladite position d'alimentation.

26. Appareil suivant la revendication 25, caractérisé en ce que ledit mécanisme de transport comporte encore une griffe de contact (E4) montée pour se déplacer sur ledit pousseur (E1) en s'engageant et en se désengageant d'un élément crochet (A3) dudit conteneur (A).

27. Appareil suivant la revendication 23, caractérisé en ce que ledit dispositif d'inversion (2) comporte en côté ouvert vers le haut dans ladite position d'alimentation et un couvercle actionna-

49

EP 0 334 115 B1

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ble sélectivement (2_{a3}, 2_{a5}) passant au-dessus d'au moins une partie dudit côté ouvert.

28. Appareil suivant la revendication 27, caractérisé en ce que ledit dispositif de transport (2) est prévu pour déplacer ledit dispositif d'inversion séquentiellement de ladite position d'alimentation vers le haut vers une position haute extrême et de là vers le bas, de sorte que ledit côté ouvert est tourné vers le bas vers ladite position de déchargement.

29. Appareil suivant la revendication 23, caractérisé par une pièce entraînée (3a) reliant lesdites plaques avant et arrière (3b, 3c) et adaptée pour supporter lesdits objets déchargés à ladite position de déchargement.

30. Appareil suivant la revendication 29, caractérisé en ce que ladite pièce entraînée (3a) comporte une surface de réception pour supporter lesdits objets (B) et mobile entre une position de support légèrement au-dessus d'une surface supérieure dudit convoyeur d'alimentation (1) et une position rétractée où lesdites plaques de cloison avant et arrière (3b, 3c) sont au-dessous de ladite surface supérieure dudit convoyeur d'alimentation (1).

31. Appareil suivant la revendication 30, caractérisé par un premier appareil d'entraînement (3d) associé en fonctionnement avec ladite pièce entraînée (3a) pour déplacer ladite pièce entraînée dans une direction pratiquement verticale entre ladite position de support et ladite position rétractée.

32. Appareil suivant la revendication 31, caractérisé par un second appareil d'entraînement (3e) associé en fonctionnement avec ladite pièce entraînée (3a) pour déplacer ladite pièce entraînée (3a) pratiquement dans ladite direction prédéterminée dudit passage d'alimentation (1) à partir d'une position de réception vers une position avancée voisine de ladite plaque de cloison avant dudit mécanisme de cloison.

33. Appareil suivant la revendication 23, caractérisé en ce que ledit mécanisme de conteneur comporte encore au moins une plaque de côté (1a) mobile sélectivement, placée le long du côté dudit passage d'alimentation (1);

34. Appareil suivant la revendication 23, caractérisé en ce que ledit mécanisme de conteneur comporte encore une plaque de côté (1a) mobile sélectivement, placée sur l'un ou l'autre des côtés dudit passage d'alimentation (1).

35. Appareil suivant la revendication 23, caractérisé par un mécanisme de fermeture (4) situé le long dudit passage d'alimentation (1) en aval de ladite extrémité avant de ladite configuration prédéterminée dans ladite direction prédéterminée dudit passage d'alimentation (1), à la position de déchargement, pour bloquer le mouve-

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ment en avant desdits objets (B) sur ledit passage d'alimentation (1).

36. Appareil suivant la revendication 35, caractérisé en ce que ledit mécanisme de fermeture (4) comprend une plaque volet (4a) monté sur l'un ou l'autre côté dudit convoyeur d'alimentation (1) pour un mouvement alternatif entre une position fermée où lesdits plaques volets (4a) sont écartées d'une distance plus petite que la longueur d'un desdits objets en forme de tiges (B) et une position ouverte où lesdites plaques volets (4a) sont écartées d'une distance plus grande que la longueur d'un desdits objets en forme de tiges (B).

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37. Appareil suivant la revendication 23, caractérisé par un appareil d'entraînement (5e) pour entraîner ledit convoyeur d'alimentation (1), un appareil d'entraînement (5b) pour entraîner ledit mécanisme latéral d'alimentation, et un appareil pour entraîner ledit convoyeur d'alimentation et ledit mécanisme latéral d'alimentation, à pratiquement la même vitesse.

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38. Appareil suivant la revendication 37, caractérisé en ce que ledit appareil d'entraînement dudit mécanisme latéral d'alimentation et ledit appareil d'entraînement dudit convoyeur d'alimentation partagent un moteur commun d'entraînement (5e).

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39. Appareil suivant la revendication 38, caractérisé en ce que ledit appareil d'entraînement dudit convoyeur d'alimentation comporte un embrayage pour arrêter le mouvement dudit convoyeur d'alimentation, pendant des temps prédéterminés.

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40. Appareil suivant la revendication 39, caractérisé en ce que ledit mécanisme latéral d'alimentation (5) comprend une pièce animée d'un mouvement alternatif (5) pour faire avancer lesdits objets dans la direction du mouvement dudit convoyeur d'alimentation (1) et dans lequel lesdits temps prédéterminés auxquels ledit embrayage arrête le mouvement dudit convoyeur d'alimentation (1) surviennent pendant le retrait de ladite pièce animée d'un mouvement alternatif (5) dans une direction pratiquement opposée à la direction du mouvement dudit convoyeur (1).

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41. Appareil suivant la revendication 23, caractérisé en ce que ledit mécanisme latéral d'alimentation (5) comprend une plaque latérale d'alimentation (5) pour venir en contact avec ladite extrémité arrière de ladite configuration desdits objets en forme de tiges (B), ayant une largeur en travers de ladite direction prédéterminée dudit passage d'alimentation (1) plus petite que la longueur d'un desdits objets en forme de tiges (B).

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42. Appareil suivant la revendication 41, caractérisé en ce que ledit convoyeur d'alimentation (1) comprend une pluralité d'éléments de convoyage côté à côté (1), dont au moins deux sont écartés d'une quantité prédéterminée, dans lequel ledit mécanisme de conteneur comprend un mécanisme de cloisonnement qui comporte la plaque de cloisonnement avant (3b) en saillie vers l'avant pour être en contact avec une extrémité aval de ladite configuration prédéterminée des objets (B), et une plaque de cloisonnement arrière (3c) en saillie vers l'amont pour être en contact avec une extrémité amont de ladite configuration prédéterminée des objets, ladite pièce entraînée (3a) reliant ladite plaque de cloisonnement avant (3b) et ladite plaque de cloisonnement arrière (3c) à leurs extrémités inférieures respectives, ledit mécanisme de cloisonnement pouvant fonctionner pour se déplacer entre une position rétractée au-dessous d'une surface supérieure dudit passage d'alimentation (1) et une position de support où ladite plaque de cloisonnement avant (3b), ladite plaque de cloisonnement arrière (3c) et ladite surface supérieure de support de ladite pièce entraînée (3a) sont situées entre deux de ladite Z des éléments de convoyage (1), côté à côté, pour contenir lesdits objets en forme de tiges dans pratiquement ladite configuration prédéterminée.

43. Appareil suivant la revendication 42, caractérisé en ce que ledit mécanisme de cloisonnement peut fonctionner pour déplacer lesdits objets en forme de tiges dans pratiquement ladite configuration prédéterminée dans pratiquement ladite première direction.

44. Appareil suivant la revendication 43, caractérisé par un mécanisme de fermeture (4) situé le long dudit passage d'alimentation (1) en aval de ladite extrémité avant de ladite configuration prédéterminée dans ladite première direction dans ladite position de décharge, où ledit mécanisme de cloisonnement (4) peut fonctionner pour déplacer lesdits objets en forme de tiges (B) vers une position pratiquement adjacente audit mécanisme de fermeture (4), de manière que ledit mécanisme de fermeture (4) bloque le mouvement desdits objets en forme de tiges dans ladite première direction.

45. Appareil suivant la revendication 44, caractérisé en ce que lesdits éléments de convoyage (1) sont entraînés en mouvement et dans lequel le mécanisme de fermeture (4) est mobile entre une position de blocage et une position ouverte, et dans lequel, dans ladite position ouverte, ledit mécanisme d'alimentation (5) et lesdits éléments de convoyage (1) se déplacent pratiquement à la même vitesse dans ladite première

direction pour faire avancer lesdits objets en forme de tiges à partir de la position de déchargement.

46. Appareil suivant la revendication 45, caractérisé par un dispositif de stockage communiquant avec ledit passage d'alimentation en aval de ladite position de déchargement desdits objets en forme de tiges de manière que lesdits objets en forme de tiges s'avancent vers ledit dispositif de stockage.

47. Appareil suivant la revendication 42, caractérisé en ce que ladite plaque de cloisonnement arrière (3c) comprend une paire de plaques de cloisonnement arrière (3c) écartées d'une distance plus grande que ladite largeur de ladite plaque d'alimentation latérale (5) pour permettre à celle-ci de passer entre ladite paire de plaques de cloisonnement arrière (3c) pour être en contact avec ladite extrémité arrière de ladite configuration prédéterminée des objets (B).

48. Appareil suivant la revendication 23, caractérisé par une surface de réception (6), relativement stationnaire, pour recevoir lesdits objets (B) dans ladite configuration prédéterminée à ladite position de déchargement, et un mécanisme de transfert (7) pour transférer lesdits objets dans ladite configuration prédéterminée vers ledit passage d'alimentation (1).

49. Appareil suivant la revendication 48, caractérisé en ce que ledit passage d'alimentation (1) comporte une surface supérieure de support et dans lequel ladite surface de réception (6) est pratiquement au niveau de ladite surface supérieure de support et dans lequel ledit mécanisme de transfert comprend un mécanisme pousseur (7) destiné à pousser lesdits objets (B) dans ladite configuration prédéterminée à travers ladite surface de réception (6) sur ladite surface supérieure de support dudit passage d'alimentation (1).

50. Appareil suivant la revendication 49, caractérisé en ce que ledit mécanisme pousseur (7) comprend une plaque de poussée (7) montée pour se déplacer à travers ladite surface de réception quand lesdits objets sont poussés à travers ladite surface de réception vers une position le long dudit passage d'alimentation (1) pour ainsi fonctionner comme guide quand lesdits objets dans ladite configuration prédéterminée se déplacent le long dudit passage d'alimentation dans ladite première direction, et comprenant encore une plaque de mur de côté (1b) placée le long d'un côté opposé dudit passage d'alimentation (1) de ladite plaque de poussée (7).

51. Appareil suivant la revendication 50, caractérisé en ce que ladite plaque de mur de côté (1a) est monté pour se déplacer en relation avec

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EP 0 334 115 B1

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ladite plaque de poussée (7) dudit mécanisme de transfert (7) et à la même vitesse qu'elle, pour maintenir entre elles un écartement légèrement plus grand que la longueur d'un desdits objets (B) pour tenir lesdits objets dans ladite configuration prédéterminée durant le transfert.

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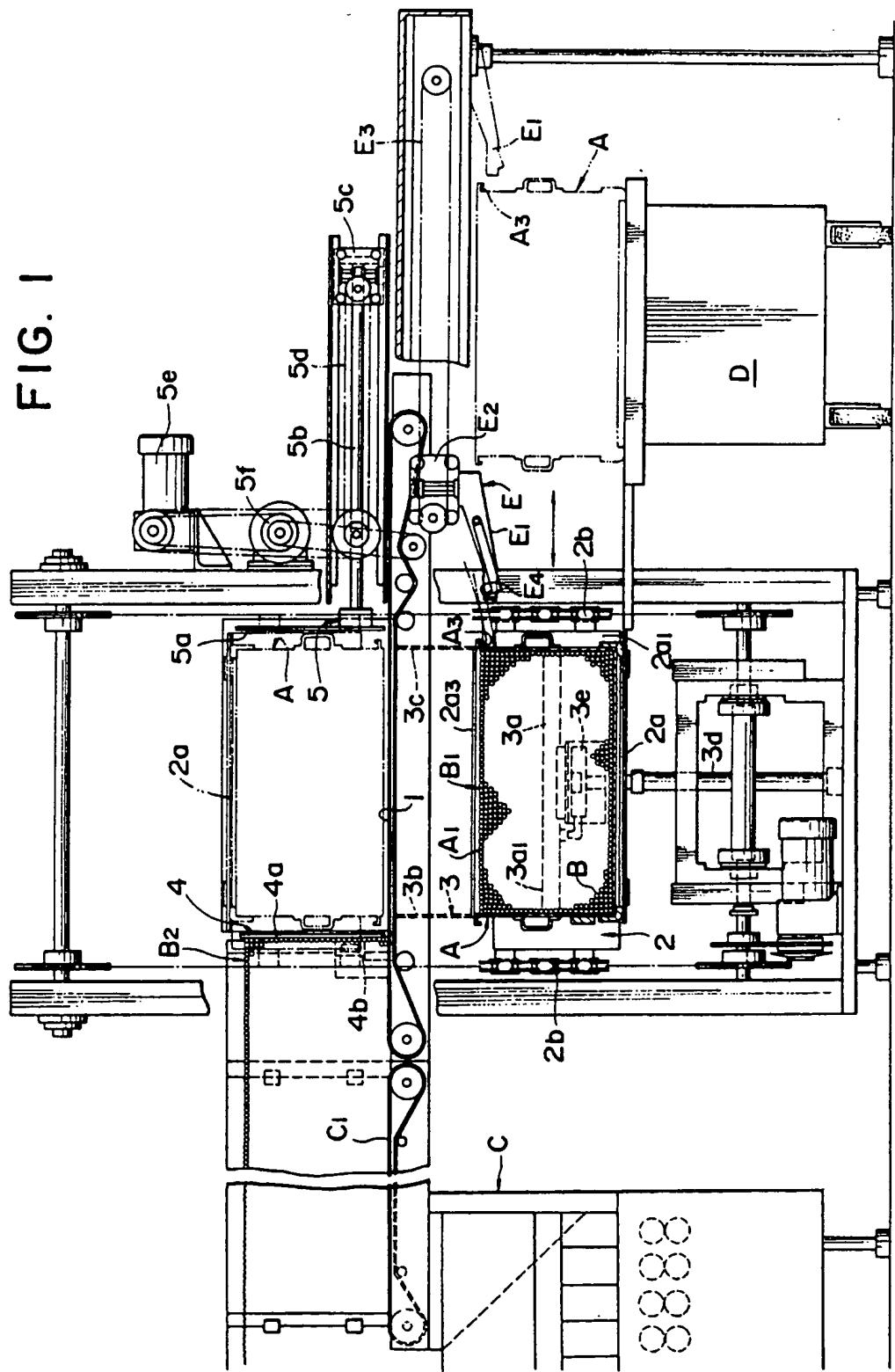
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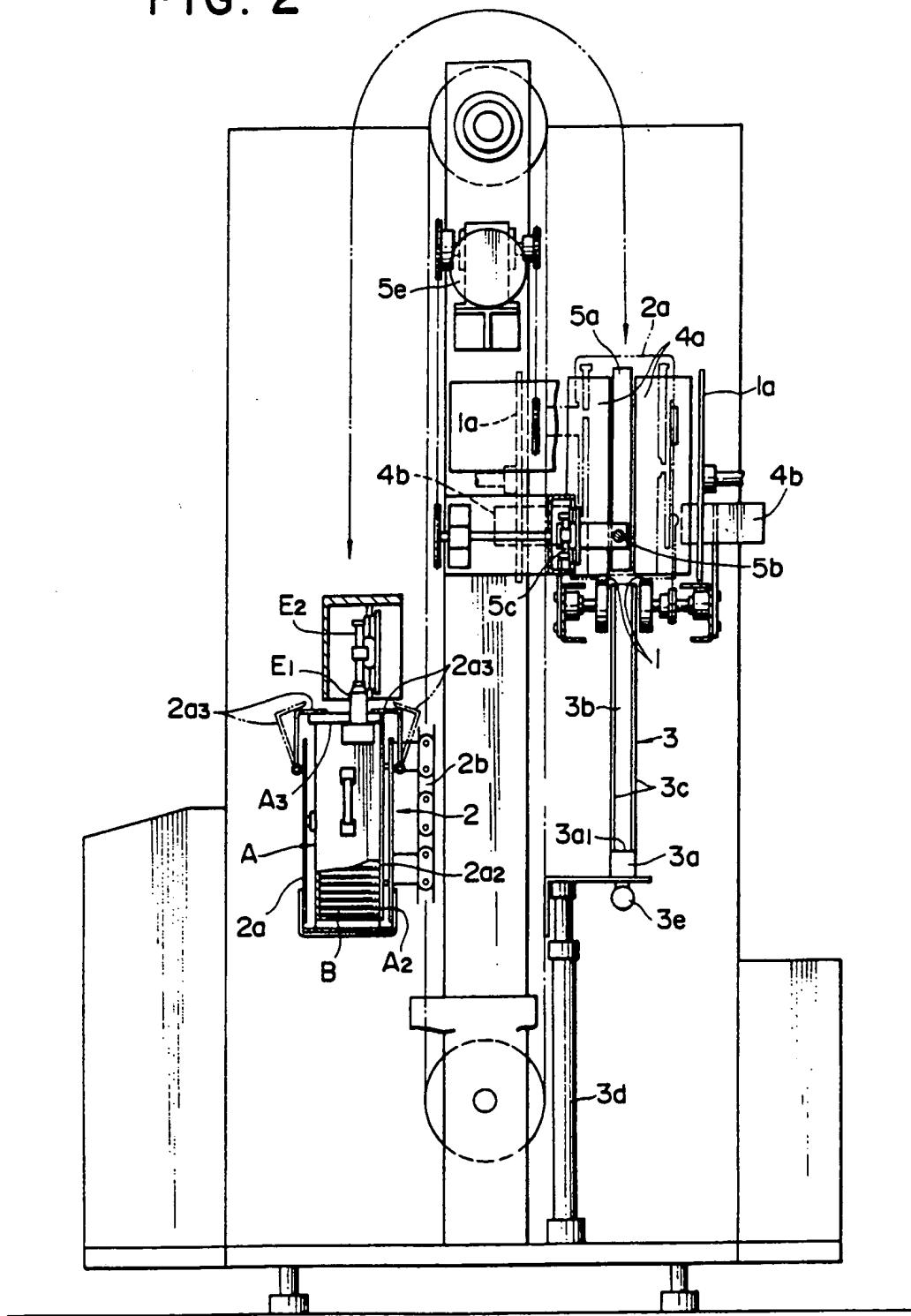
EP 0 334 115 B1

FIG. 1



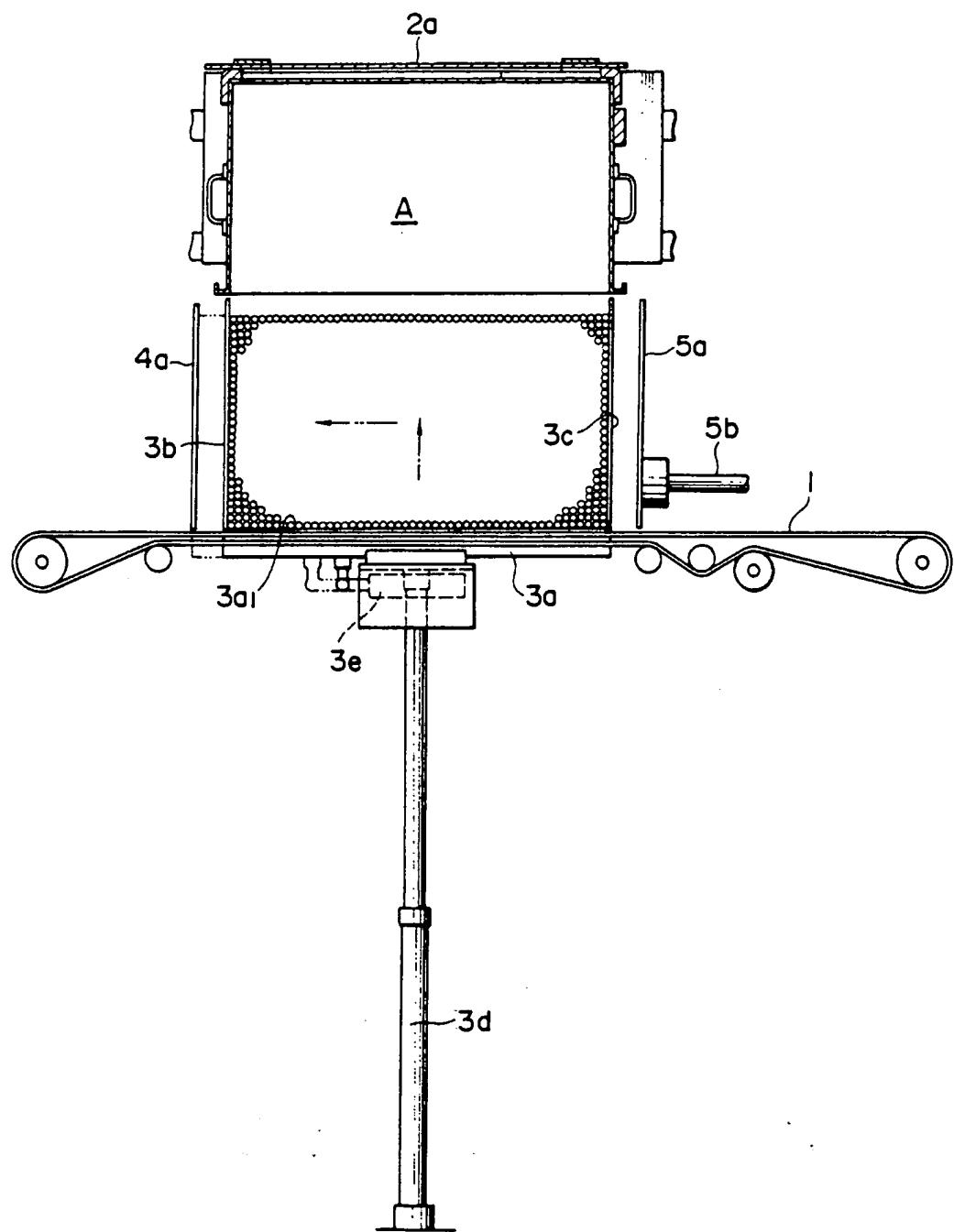
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FIG. 2



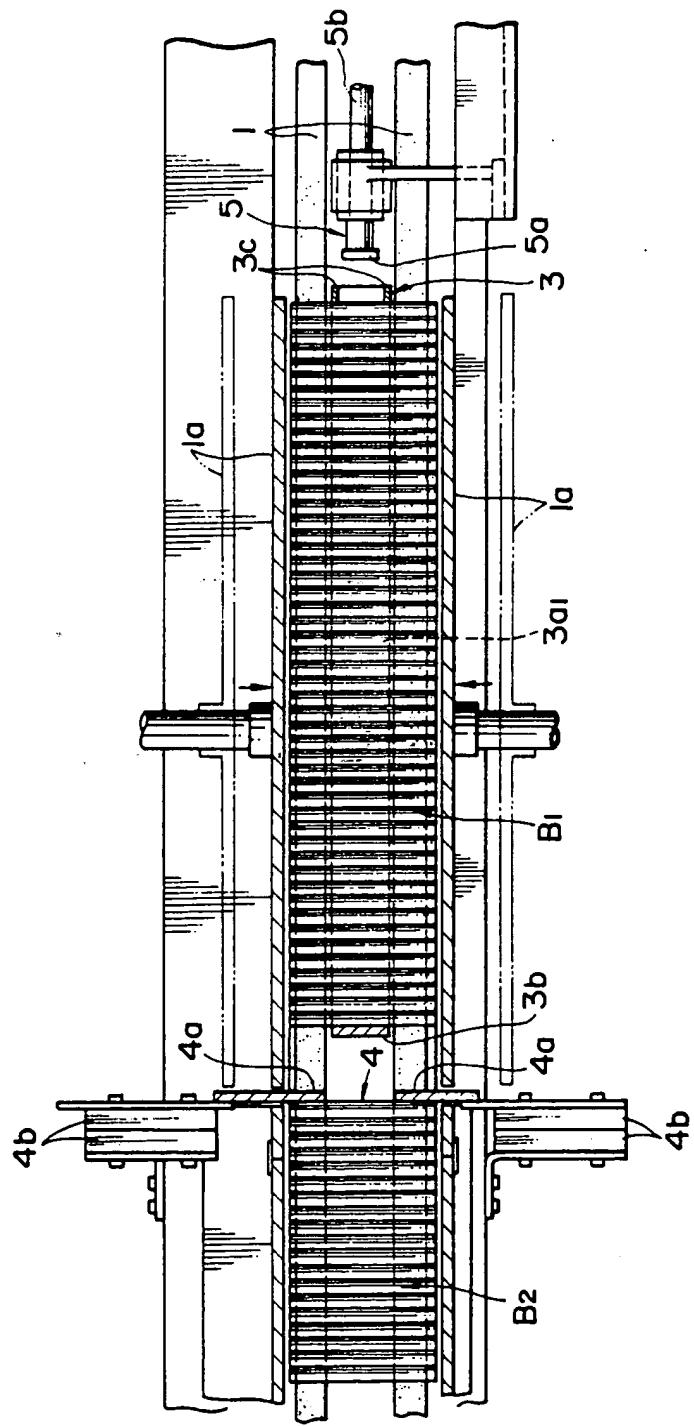
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FIG. 3



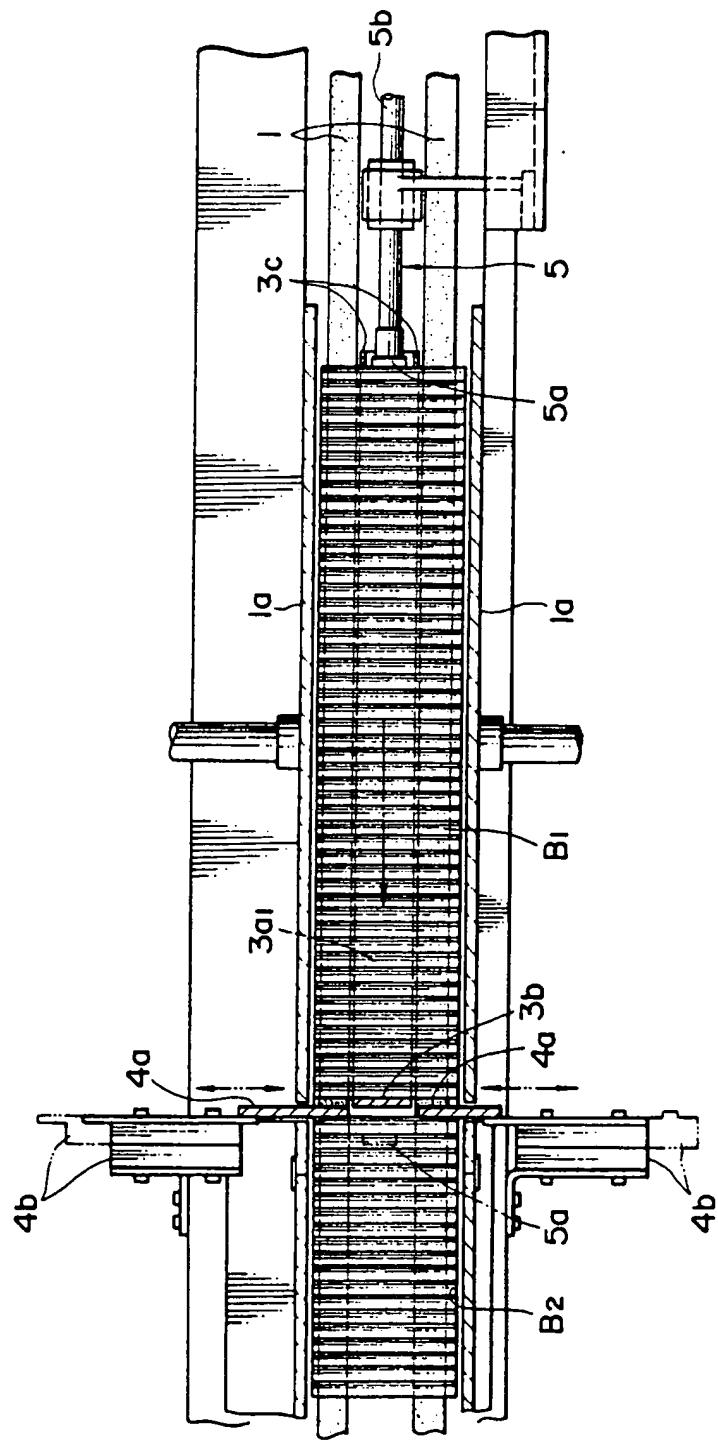
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FIG. 4



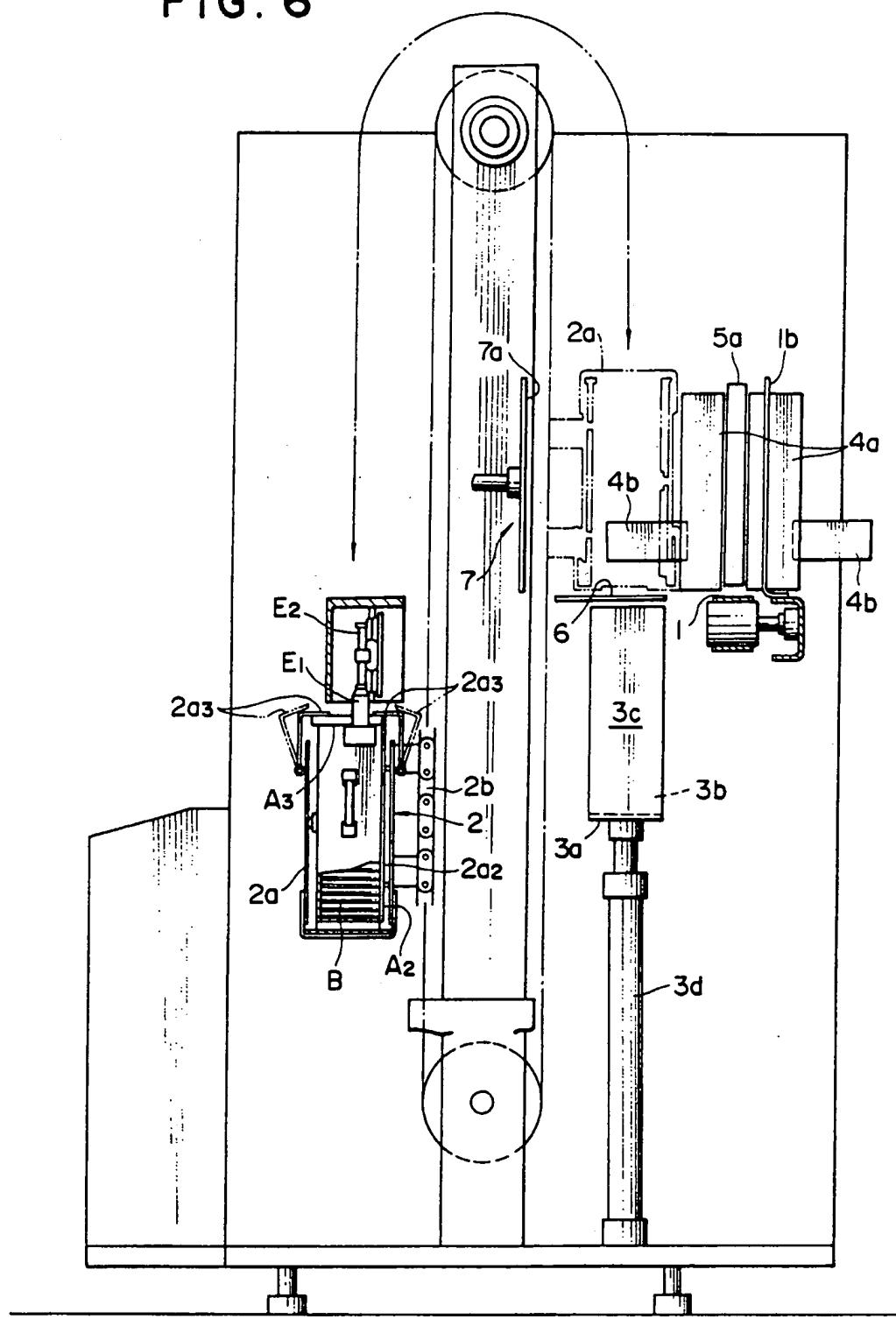
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FIG. 5



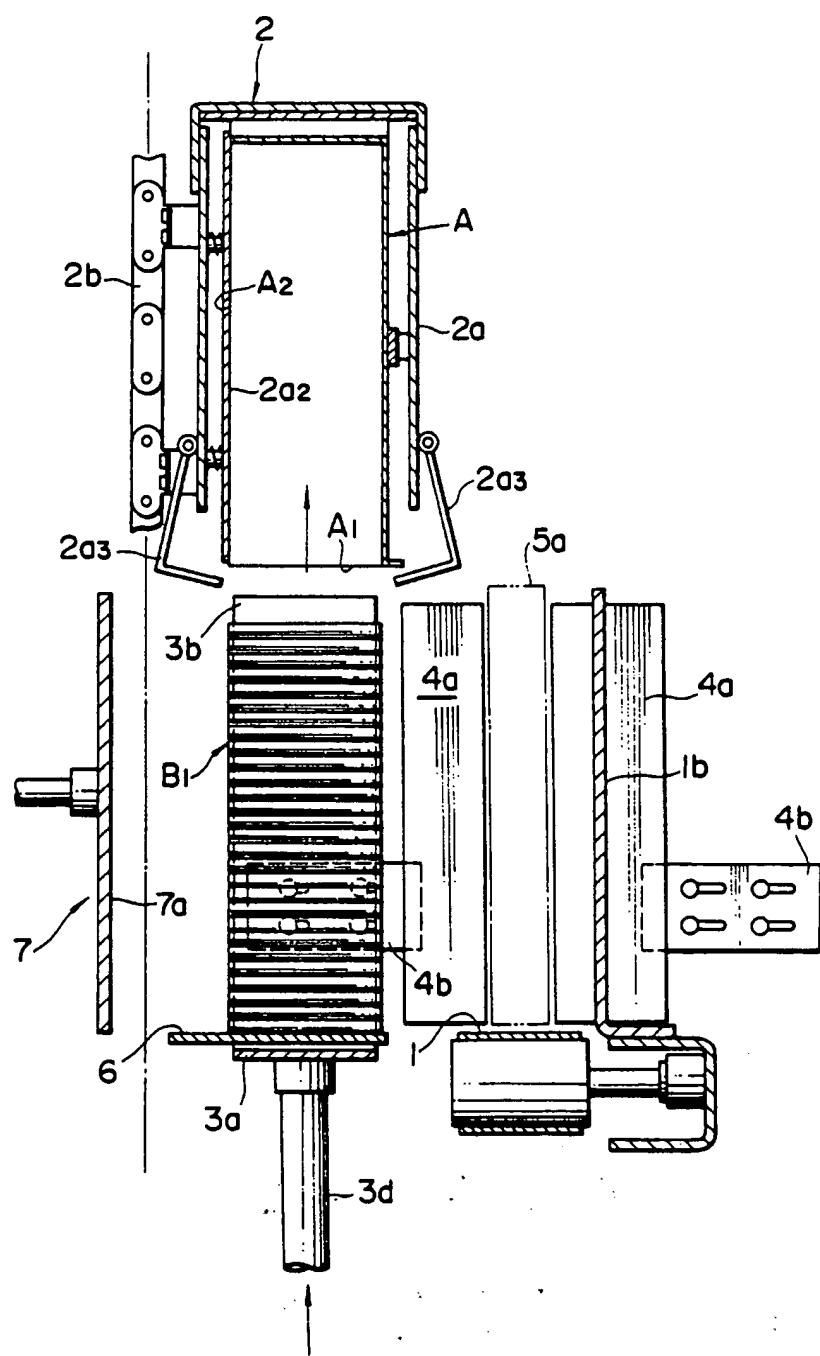
EP 0 334 115 B1

FIG. 6



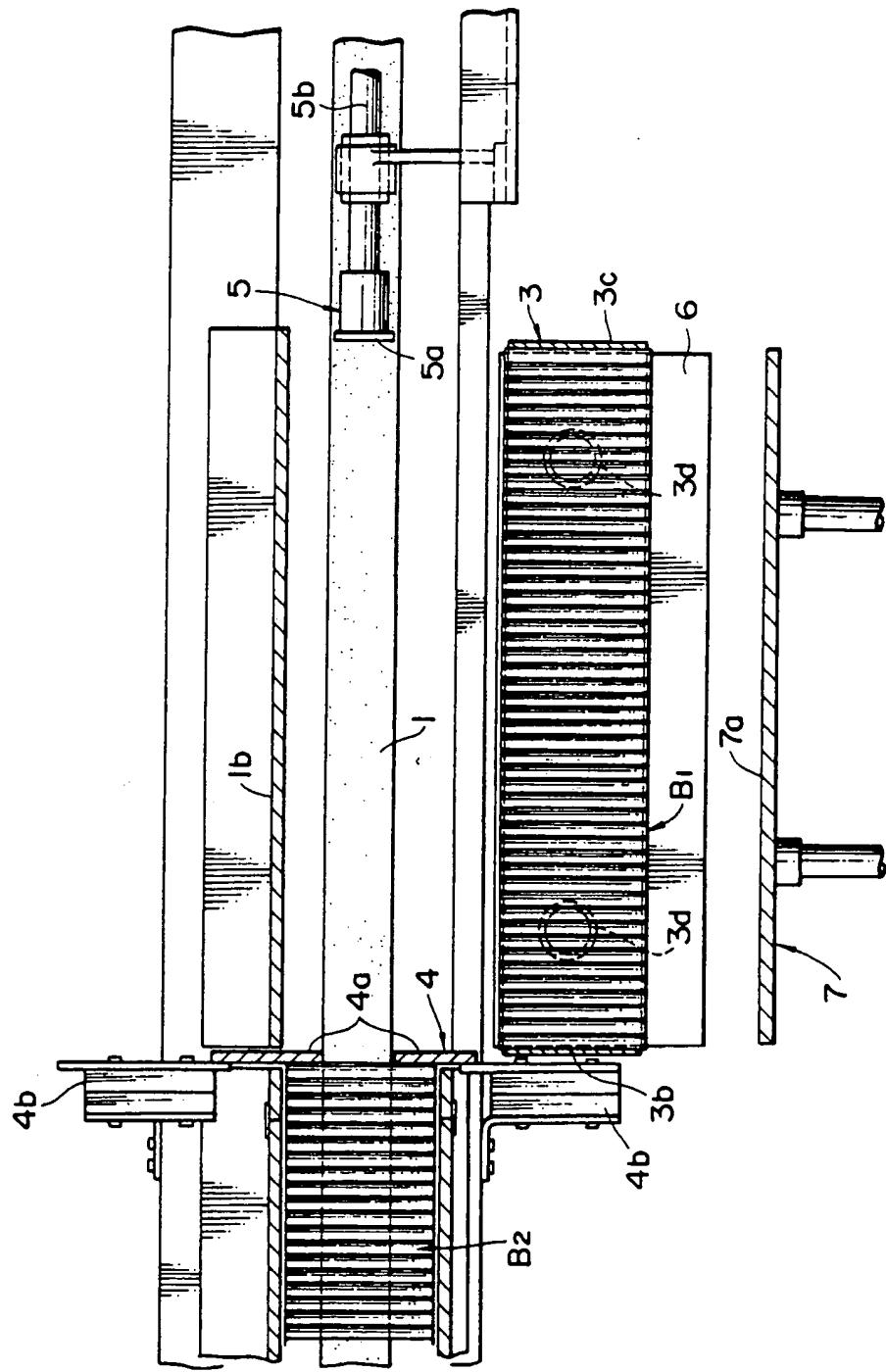
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FIG. 7



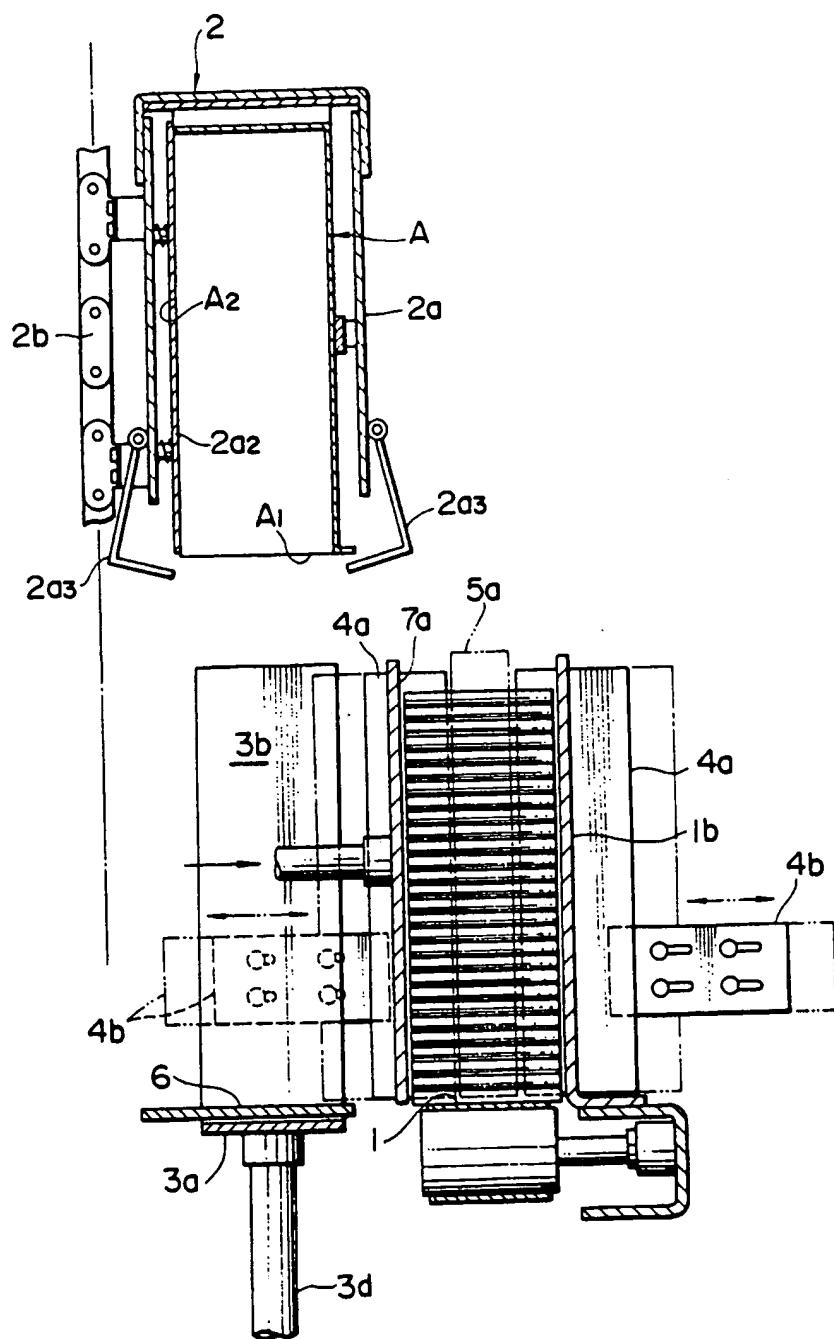
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FIG. 8



EP 0 334 115 B1

FIG. 9



EP 0 334 115 B1

FIG. 10

